

Basics in Clinical Nutrition



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Basics in Clinical Nutrition

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Egypt

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Course Description

This course will focus on the nutritional care process and approaches in the different life cycle stages. This involves describing and understanding the nutritional screening and assessment tools. Students will learn the anthropometric skills within the nutritional assessment tools and identify procedures used for energy measurement. The course will cover the principles of healthy eating, characteristics of a healthy diet and the nutritional needs for different age and gender groups. They will also learn how to calculate the total caloric needs for individuals and apply the principles and guidelines of diet planning during the different life stages from the nutritional point of view. The basics of food safety and its practical application will be studied during the course. They will also gain practical experience in obtaining proper clinical and dietetic history, analyze the nutritional data of individuals which will enable them to determine their nutritional needs. These skills are needed to be a competent technician specialized in nutrition.

Core Knowledge

By the end of this course, students should be able to:

- Define the nutritional care process and its various components.
- Identify the different tools for nutritional assessment, advantages, limitations and when to apply each one
- Describe nutritional screening tools to identify individuals at risk of nutritional problems
- Determine the steps used in nutritional planning during the different stages of life
- Identify the principles of healthy eating, food groups, exchange list, dietary reference guidelines and food composition tables to plan a healthy diet for individuals
- Identify energy measurements and the individualized caloric needs

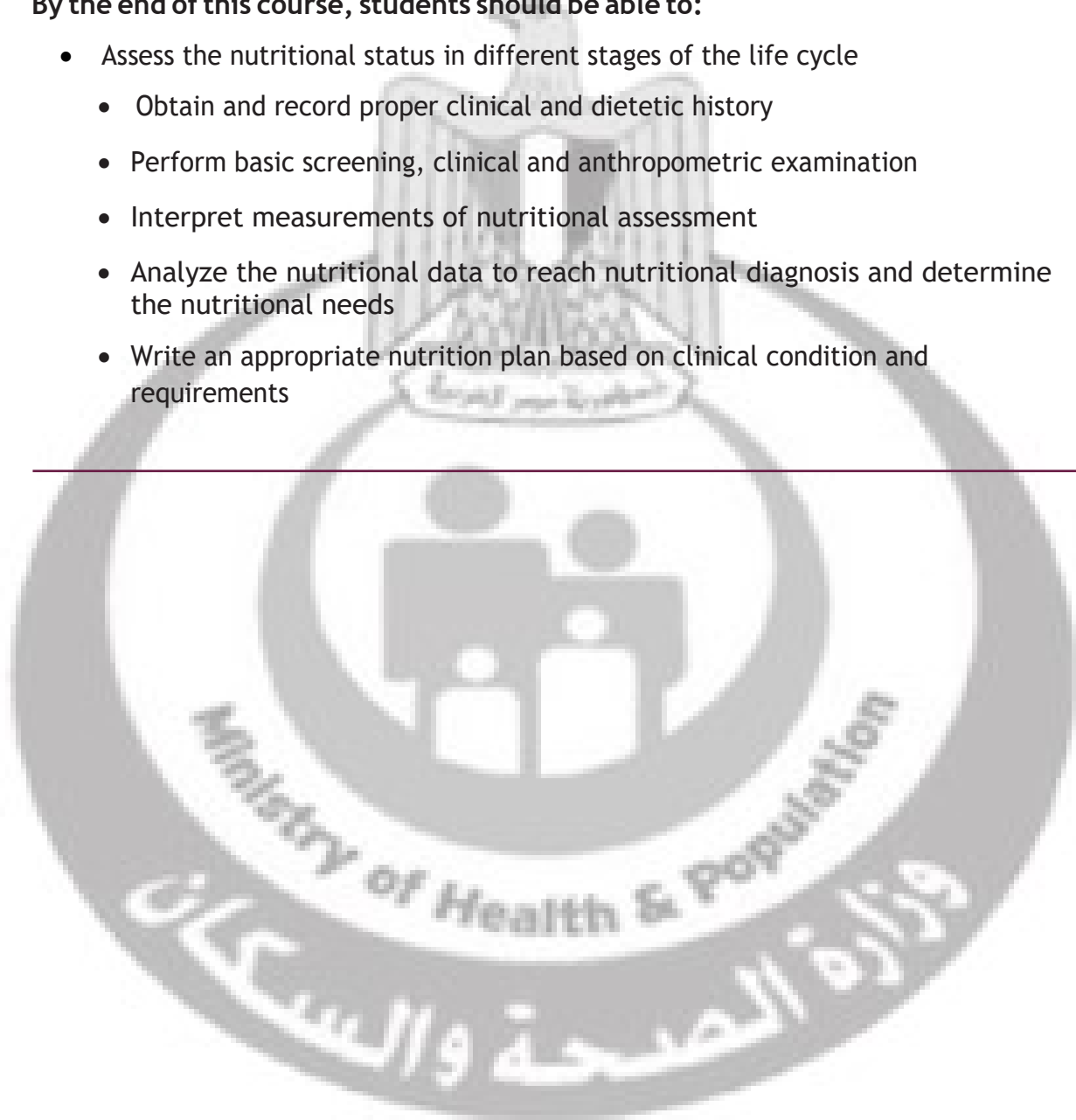
in the lifecycle approach

- List the WHO guidelines for safe food

Core Skills

By the end of this course, students should be able to:

- Assess the nutritional status in different stages of the life cycle
- Obtain and record proper clinical and dietetic history
- Perform basic screening, clinical and anthropometric examination
- Interpret measurements of nutritional assessment
- Analyze the nutritional data to reach nutritional diagnosis and determine the nutritional needs
- Write an appropriate nutrition plan based on clinical condition and requirements



Course Overview

		<i>Methods of Teaching/ Training with Number of Total Hours per Topic</i>				
ID	Topics	Interactive Lecture	Field Work	Class Assignments	Research	Lab
1	Nutritional care process (NCP) unit 1 Definition and rational Model and supporting system Steps in NCP	2		1		
2	Nutritional screening tools	2		2		
3	Assessment of nutritional status Dietary Indicators	2		1		
4	Assessment of nutritional status Anthropometric	2		3		
5	Assessment of Nutritional Status (Physical and Clinical Examination and Biochemical Indicators)	2		4		
6	Nutritional Assessment in Pregnancy, Pediatrics and Adolescence	2		1		
7	Nutritional Assessment in Geriatrics	2				
8	Nutrition planning I	2				
9	Nutrition planning II	2				
10	Exchange list	2				
11	Nutrition Intervention	2				
12	Basics in food safety	2				
TOTAL HOURS (36)		24		12		

Chapter 1

Nutritional Care Process

Objectives

Definition and rational

- Model and supporting system
- Steps in NCP:
 - Nutrition assessment
 - Nutrition diagnosis
 - Nutrition intervention
 - Nutrition monitoring and evaluation

Overview of

Intended Learning Objectives

- Differentiate between a normal, patient at risk, and malnourished individual
- Understand the measures of Assessment and Screening
- Analysis of the nutritional data to reach the nutritional diagnosis and determine nutritional needs
- Determine the energy and protein requirements

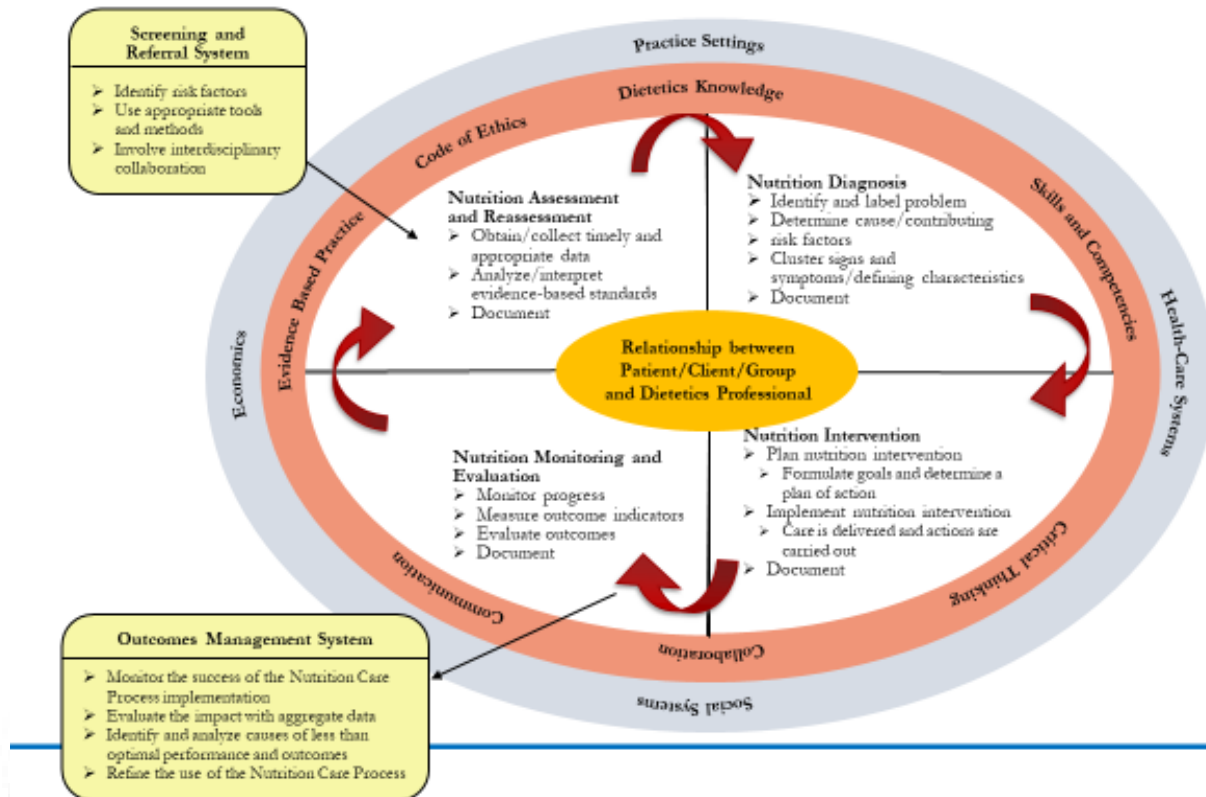
Why To Nutritionally Care?

- Identify persons at nutritional risk
- Diagnose an existing nutrition problem
- Plan and implement a nutrition intervention
- Monitor the patients

What is The Nutrition Care Process

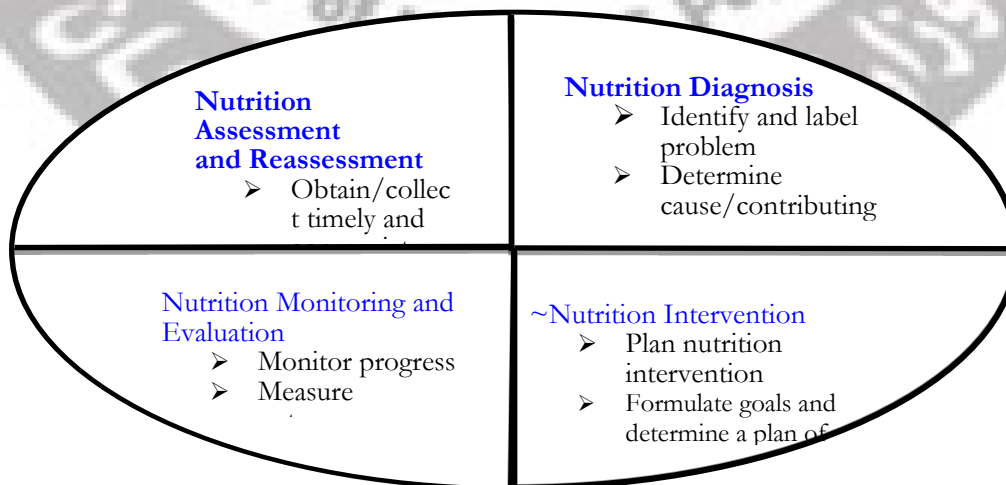
- Systematic problem solving method developed by the Academy of Nutrition and Dietetics in the year 2003
- Allow Nutritionists to use:
 - Critical-thinking skills to make evidence-based decisions addressing the nutrition-related problems
 - Terms & phrases organized into domains with unique codes to:
 - Assess, diagnose, manage, monitor

Nutrition Care Process Model



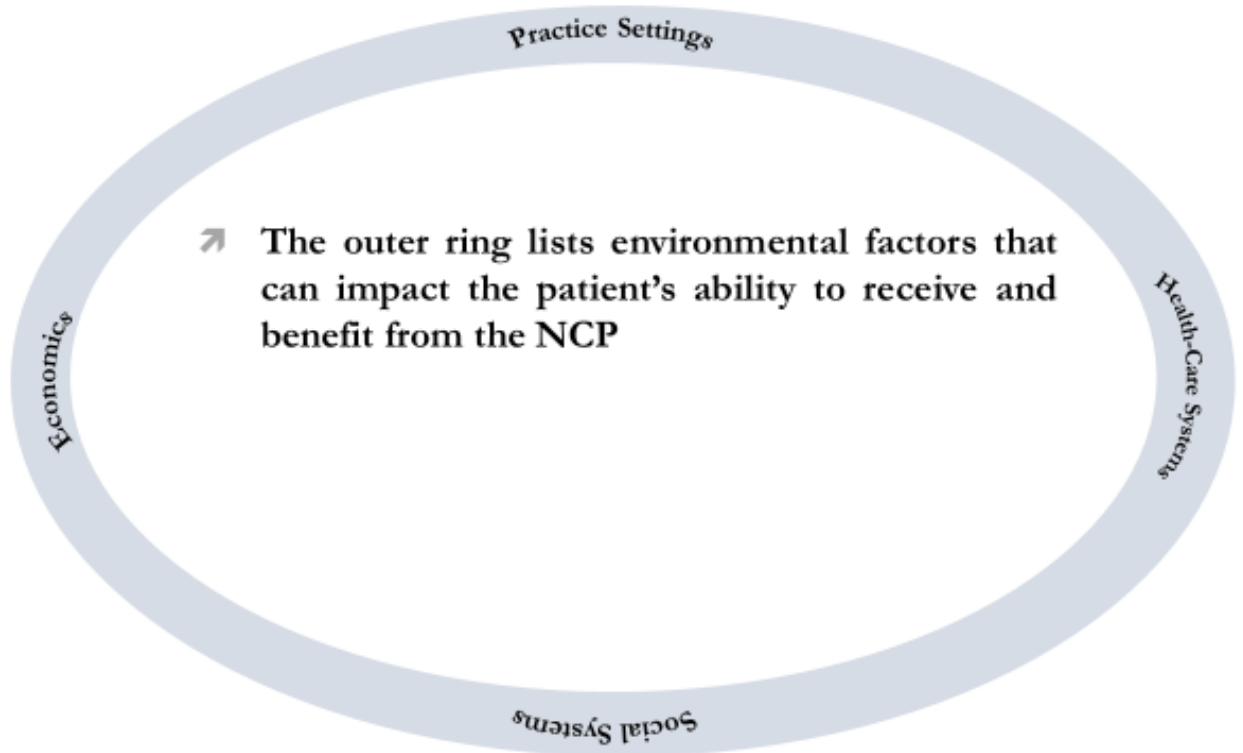
Nutrition Care Process Model

- Relationship between Patient/Client/Group and Dietetics Professional
- The practitioner should interact with the patients in a respectful, empathetic, nonjudgmental, and culturally sensitive manner and demonstrate good listening skills

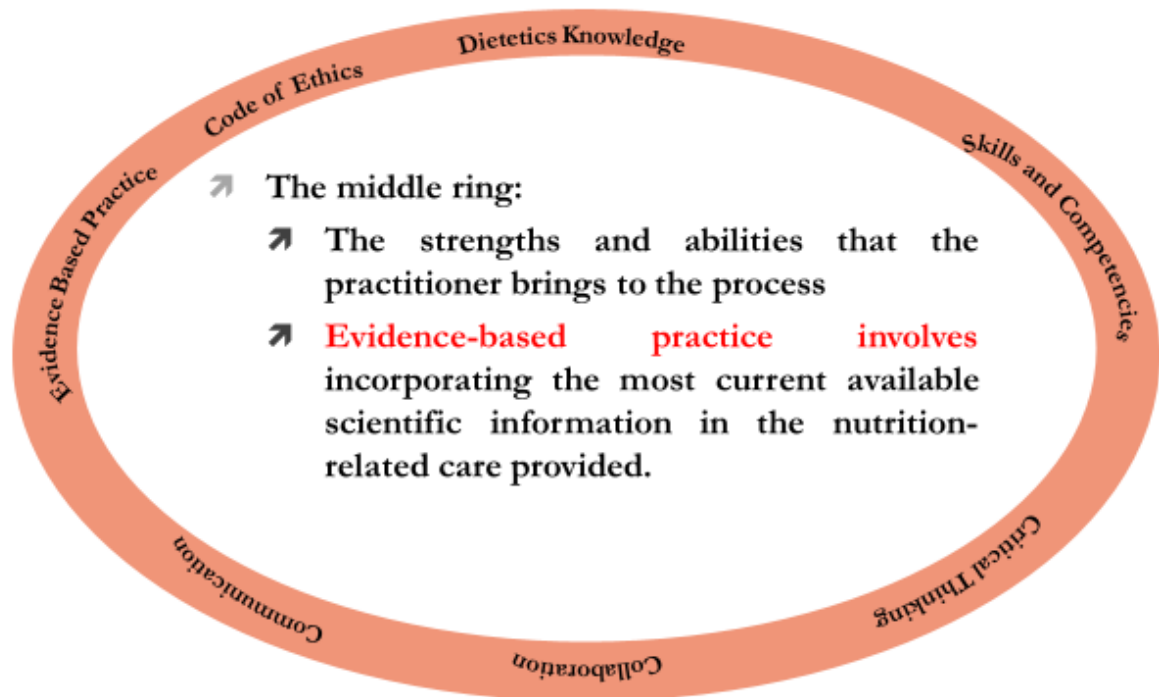


The inner figure lists the four steps of the NCP:

Assessment, Diagnosis, Intervention, and Nutritional monitoring



Two Supporting Systems



Screening & Referral System

- Identify risk factors
- Use appropriate tools and methods
- Involve interdisciplinary collaboration

Outcome Management System

- Monitor the success of the Nutrition Care Process implementation
- Evaluate the impact with aggregate data
- Identify and analyze causes of less than optimal performance and outcomes
- Refine the use of the Nutrition Care Process

Chapter 2

Nutritional Screening

Objectives

- Overview on nutritional screening tools
 - Screening Tools
 - Assessment Tools

• Overview of

- A process to identify an individual who is malnourished or who is at risk for malnutrition:
 - To determine if a detailed nutritional assessment is indicated or not
- Because may be done by someone other than a dietetics professional is considered an external supportive system and not a step within the NCP.
- To detect and prevent problems early

When To Screen Individuals?

- On admission to care homes
- Health check-ups
- Vaccines
- Within 48 hours of admission to the hospital

Information Included in Nutrition Screening

- Information included in Nutrition Screening:
 - Age, medical diagnosis, severity of illness
 - weight changes, use of medications
 - Tissue wasting, loss of subcutaneous fat
 - Changes in appetite or food intake
 - Problems that interfere with food intake
 - Food allergy, diseases, anaemia, dementia

Screening And Assessment Tools

1. Nutritional Risk Index, for screening
2. Subjective Global Assessment
3. Malnutrition Universal Screening Tool
4. Nutrition Risk Screening
5. MNA for elderly

Nutritional Tips

- **For more efficient & cost effectiveness collection:**
 1. Screening can be performed by a trained personnel
 2. Assessment is performed by nutritionist

Nutrition Assessment Tools

1. Nutrition Risk Index=

$\{1.519 \times \text{serum albumin (g/dl)}\} + \{0.417 \times (\text{current weight/usual})\}$

2. Subjective Global Assessment (SGA)

Ref: medsci.indiana.edu/c602web/602/c602web/nurrit/docs/pg_sga.pdf

3. Malnutrition Universal Screening Tool (MUST)

- Categorize those people at risk of malnutrition
- Is Easy to use, rapid, reproducible and internally consistent
- Referred to in the NICE clinical guideline on nutrition support and has therefore been included in these guidelines as the preferred screening tool

www.bapen.org.uk

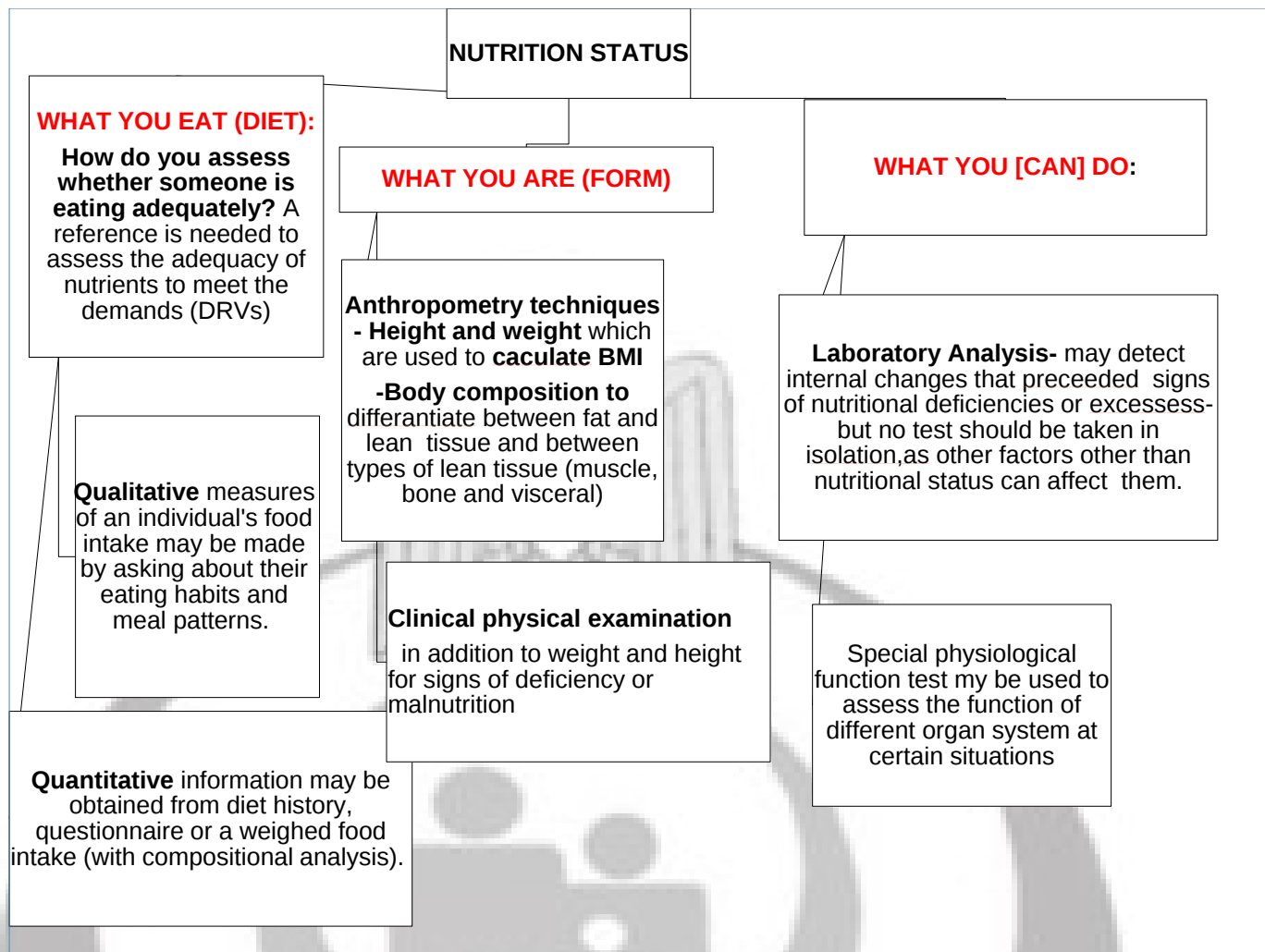
4. Nutritional Risk Screening- Nrs-2002

- It contains the nutritional components of MUST in addition to
 - A grading of severity of disease as a reflection of increased nutritional requirements

5. Mini Nutritional Assessment-MNA

- The purpose of MNA is to detect the presence of under nutrition and the risk of developing under nutrition among the elderly
- Prevalence of under nutrition among the elderly (15-60%)

**Nutrition Status Assessment as Indicated by The South Hampton Group
The English Way**



Subjective and Objective Data Collection

- **Types of data include:**
 - Subjective
 - Objective information
- **Subjective Data:**
 - Include information usually obtained during interviews
 - Coming directly from the patient, family members, or significant others

Examples Of Subjective Food/Nutrition-related History Assessment

Category	Specific Examples
Food and nutrient intake	Mother reporting child's food intake for previous 24 hours.
Medication and herbal intake	Patient reporting current medications.

Knowledge/beliefs/ attitudes	Patient stating that he avoids “sweets and desserts” as his diet modification for diabetes.
Behavior	Patient decides that he will eat only while sitting at kitchen table with family members.
Factors affecting access to food and food-/ nutrition-related supplies	Patient reports that he only has access to microwave and does not have a stove or oven.
Physical activity and function	Patient is unable to perform more than 10 minutes of walking physical activity.
Nutrition-related patient- centered measures	Patient voices that she sees no benefit of improving blood glucose levels.

Objective Data

Information obtained from a verifiable source:

- current medical record
- previous medical histories

Could include:

- Anthropometric measurements
- Biochemical data
- Medical tests and procedures

Successful Steps For Interviewing A Patient For Data Collection

- Maintain an environment that is private and assures confidentiality
- Establish good patient rapport
- Respect religious, cultural, and familial values and needs
- Provide attentive listening skills
- Structure questions that are both open and neutral
- Avoid closed and leading questions

Chapter 3

Assessment of Nutritional Status

Dietary Indicators

Objectives

- Assessment of nutritional status
 - Nutritional Care Indicators:
 - Dietary Indicators

Overview of

- Dietary Indicators
- Anthropometric Indicators
- Physical Signs
- Biochemical Indicators
- Protein Energy Determination

Components of Nutritional Assessment : The English Way

A B C D E

- Anthropometry
- Biochemistry
- Clinical/physical state
- Dietary aspects

Dietary Indicators

1. Twenty four hour Recall
2. Food Record/Food Diary
3. Food Frequency
4. Observation of Food Intake/“Calorie Count”

1- Twenty-four-hour Recall

- Clinician guides the patient through a recall of all food and drink that has been consumed in the previous 24-hour period
- Advantages:
 - Short administration time
 - Very little cost
 - Negligible risk for the patient
- Disadvantage:
 - Does not always show typical eating patterns.
 - The patients may report information they feel the clinician wants to hear

Components of 24-hour Recall Form

24-hour recall		Date:		Patient Name:	
Time	Foods and Beverages	Serving Size	How prepared	Where	Comments:

2- Food Record/Food Diary

- The participant documents his dietary intake as it occurs over a specified period of time
- Kept over a three- or five-day period and should include a sampling of both weekdays and weekends.
- **Advantages:**
 - More representative of the person's actual intake
- **Disadvantages:**
 - Under-reporting is common
 - The participant may change food habits for the recording period.
 - A heavier burden on the participant, who must make a commitment to record his or her intake.

Food Diary

Date/Time	List all foods and drinks	Amount/serving size	Preparation/ cooking method	Seasonings/ Condiments	Where did you eat?	Who were you with?

3- Food Frequency

- A retrospective review of specific food intake in a specific tool supplied by the nutritionist
- Foods are organized into groups, and the participant identifies how often and in what quantities he consumes a specific food or food group
- The method can be self-administered

Advantages

- Inexpensive and quick to administer

Disadvantages

- Response rates tend to be lower since the tool is self-administered.
- Foods on the pre-prepared list:
 - may be inappropriate for the individual
 - may not include ethnic or child appropriate foods

- iii. May not include quantities that are realistic for those eating larger amounts, such as athletes.

4- Observation of Food Intake/ “Calorie Count”

In an acute care or long-term care setting, actual food intake can be observed and recorded when a kilocalorie (kcal) or kcal protein count is ordered



Chapter 4

Assessment of Nutritional Status

Anthropometric

Objectives

- Assessment of nutritional status
 - Nutritional Care Indicators
 - Anthropometric

Overview

- Anthropometry is the measurements of:
 - Height
 - Weight
 - BMI

Height & Weight

Measuring height and weight

Height

- ☐ Use a height stick (stadiometer) where possible. Make sure it is correctly positioned against the wall.
- ☐ Ask subject to remove shoes and to stand upright, feet flat, heels against the height stick or wall (if height stick not used).
- ☐ Make sure the subject is looking straight ahead and lower the head plate until it gently touches the top of the head.
- ☐ Read and document height.

Weight

- ☐ Use clinical scales wherever possible. Make sure they have been regularly checked for accuracy and ensure that they read zero without the subject standing on them.
- ☐ Weigh subject in light clothing and without shoes.

BMI

Calculation of body mass index (BMI)

Actual BMI can be calculated using the following equation:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

BMI	Weight	Status Health Risk
Below 18.5	Underweight	With <16 suggesting possible eating disorder and other disease risk*
18.5-24.9	Normal	Healthy, low health risk
25.0-29.9	Overweight	Associated with increased risk of disease
30.0 and above	Obese	Associated with further increased risk of disease

Interpretation of BMI in Adults

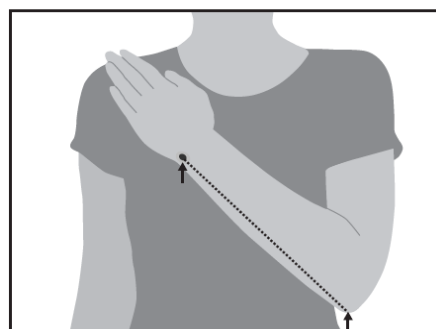
Alternative Measurements

- Height:
 - If cannot be measured, use:
 - recently documented
 - Self-reported height
- If not available:
 - Use the alternative:

1- Length of the Forearm

(i) Length of forearm (ulna)

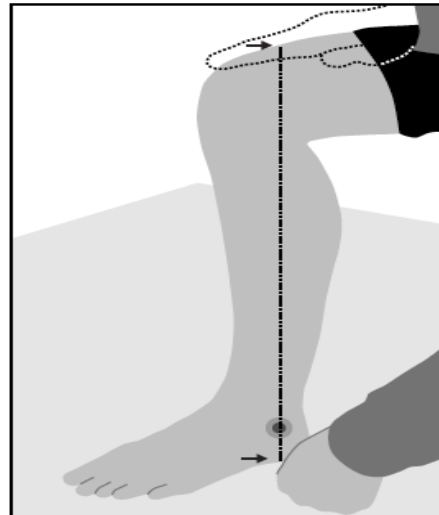
- ☐ Ask subject to bend an arm (left side if possible), palm across chest, fingers pointing to opposite shoulder.
- ☐ Using a tape measure, measure the length in centimetres (cm) to the nearest 0.5 cm between the point of the elbow (olecranon) and the mid-point of the prominent bone of the wrist (styloid process).



Actual Height is then determined from special tables

(ii) Knee height

- ☐ Measure left leg if possible.
- ☐ The subject should sit on a chair, without footwear, with knee at a right angle.
- ☐ Hold tape measure between 3rd and 4th fingers with zero reading underneath fingers.
- ☐ Place your hand flat across the subject's thigh, about 4 cm (1½ inches) behind the front of the knee.
- ☐ Extend the tape measure straight down the side of the leg in line with the bony prominence at the ankle (lateral malleolus) to the base of the heel. Measure to nearest 0.5cm.

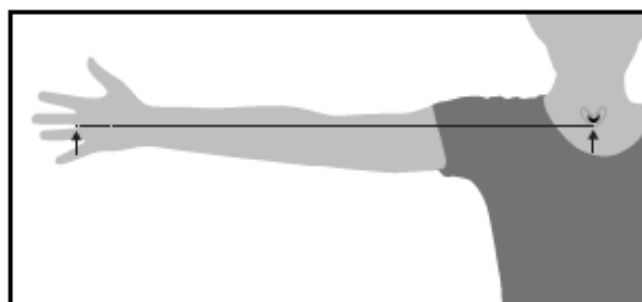


2- Knee Height

3- Demispan

(iii) Demispan

- ☐ Ideally the subject should stand as this makes taking the measurement easier.
- ☐ Locate and mark the mid-point of the sternal notch (V at the base of the neck).
- ☐ Ask the subject to raise the right arm until it is horizontal with the shoulder (give assistance if necessary, make sure wrist is straight).
- ☐ Place a tape measure between the middle and ring finger of the subject's right hand, with zero at the base of the fingers.
- ☐ Extend the tape measure along the length of the arm to the mid-point of the sternal notch and note the measurement to the nearest 0.5cm. Use the table on page 15 to convert demispan length (cm) to height (m).



Notes:

- ☐ Demispan should not be used in subjects with severe or obvious curvature of the spine (kyphosis or scoliosis).
- ☐ For bed bound subjects, those with severe disabilities and those with kyphosis or scoliosis, it is preferable to use ulna length to estimate height.

Alternative Measurement

- **Weight**
 - Subject can-not be weighed
 - Recently documented
 - Self-reported
- **Weight Change**
 - Look at subject's clothes for weight loss
 - Self-documented
 - An adult is considered at nutritional risk if there is a >5% unexplained weight change in less than one month or >10% in a six-month period

Alternative Measurement

- **BMI:**
 - If neither weight or height are available, BMI can be estimated using MUAC.

Estimating body mass index (BMI) category

If neither height nor weight can be measured or obtained, BMI can be estimated using the mid upper arm circumference (MUAC)

Measuring mid upper arm circumference (MUAC)

See Fig.1

- ☐ The subject should be standing or sitting.
- ☐ Use left arm if possible and ask subject to remove clothing so arm is bare.
- ☐ Locate the top of the shoulder (acromion) and the point of the elbow (olecranon process).
- ☐ Measure the distance between the 2 points, identify the mid point and mark on the arm.

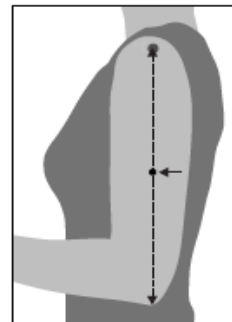


Fig. 1

See Fig.2

- ☐ Ask subject to let arm hang loose and with tape measure, measure circumference of arm at the mid point. Do not pull the tape measure tight - it should just fit comfortably round the arm.

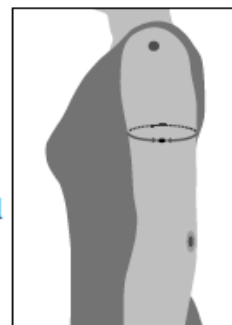


Fig. 2

If MUAC is less than 23.5 cm, BMI is likely to be less than 20 kg/m² i.e. subject is likely to be underweight.

If MUAC is more than 32.0 cm, BMI is likely to be more than 30 kg/m² i.e. subject is likely to be obese.

Weight change over time

- MUAC can also be used to estimate weight change over a period of time and can be useful in subjects in long term care.
- MUAC needs to be measured repeatedly over a period of time, preferably taking 2 measurements on each occasion and using the average of the 2 figures.

If MUAC changes by at least 10% then it is likely that weight and BMI have changed by approximately 10% or more.

Body Composition

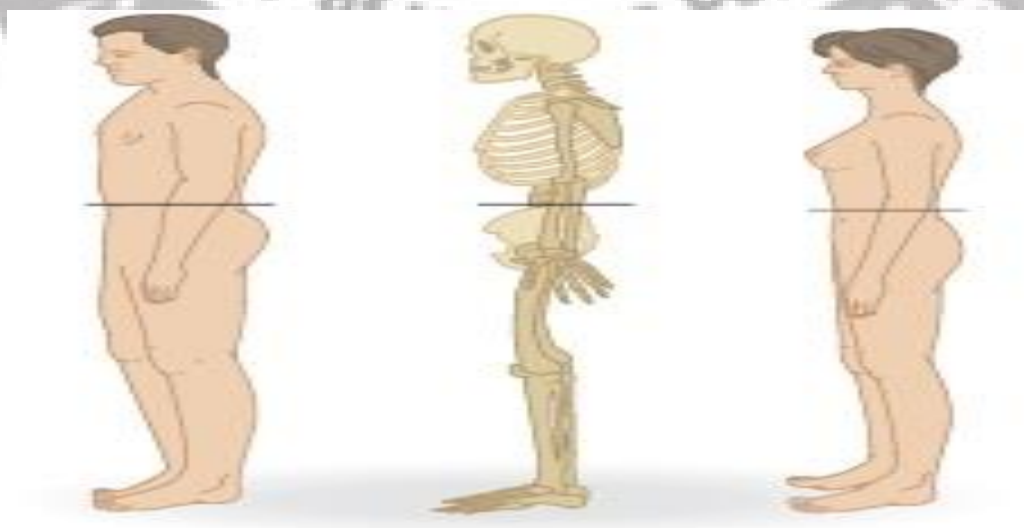
- Height and weight cannot distinguish among body compartments
 - Waist Circumference
 - Skinfold Measurement
 - Mid Arm Circumference
 - Hydrostatic (Underwater) Weighing
 - DXA
 - Air Displacement Plethysmography
 - Bioelectric Impedance

1- Waist Circumference

Waist circumference of (102 cm) for men or (88 cm) for women is considered to be predictive of obesity and chronic disease risk

Measuring Waist Circumference

The Line Shows The Appropriate Position For The Tape Measure

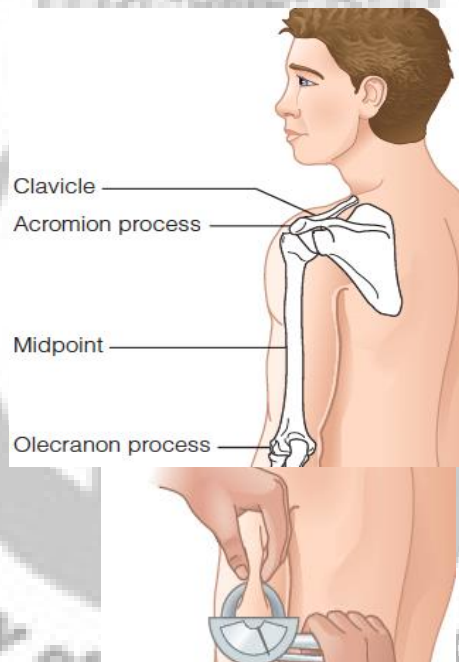


2- Skinfold Measurement

- Skinfold measurement is used to estimate energy reserves—both fat and somatic protein—in subcutaneous tissue
- Sites of measurement:
 - Chest, triceps, subscapular, midaxillary, suprailiac, abdomen, thigh, and calf.
- Triceps skinfolds:
 - taken on the non dominant arm,
 - commonest
 - halfway between the olecranon and acromial processes.

3- Mid Arm Circumference and the Skinfold for Arm Muscle Area

- Midarm circumference measurement can be combined with triceps skinfold measurement to indirectly estimate:
 - arm muscle area



- Measurements are inserted into formulas to calculate arm muscle area

Bod Pod:

A machine that uses air displacement to measure body composition. This machine is a large, egg-shaped chamber made from fiberglass. The person being measured sits inside wearing a swimsuit. The door is closed and the machine measures how much air is displaced. This value is used to calculate body composition. It appears promising as an easier and equally accurate alternative to underwater weighing in many populations, but it may overestimate body fat in some African-American men.



- Expensive.
- Less accurate in some populations.

4- Hydrostatic (Underwater) Weighing

- Underwater weighing
- Difficult procedure for the subject to complete
- Reference equations were based on only Caucasians

Dual-energy x-ray absorptiometry (DXA):

The technology is based on using very low level x-rays to differentiate among bone tissue, soft (or lean) tissue, and fat (or adipose) tissue. It involves lying for about 30 minutes on a specialized bed fully clothed, with all metal objects removed. The margin of error for predicting body fat ranges from 2% to 4%.



- Expensive; requires trained technician with specialized equipment.
- Cannot be used to measure extremely tall, short, or obese people, as they do not fit properly within the scanning area.

5- Dual Energy X-Ray Absorptiometry (DXA)

- DXA measures three compartments—mineral mass, mineral-free mass, and fat mass
- DXA was first developed to measure bone mineral content and density



6- Air Displacement Plethysmography

Individuals total volume is measured indirectly by estimating the amount of air that is displaced within a sealed chamber



7- Bioelectrical Impedance Analysis

- A small, low-frequency, alternating electrical current is administered at one extremity of the body
- Tissues that contain low amounts of water such as fat and bone are poor conductors of electricity and therefore have a greater resistance to impedance to flow of the current.



Chapter 5

Assessment of Nutritional Status

Physical and Clinical Examination and Biochemical Indicators

Objectives

- Assessment of nutritional status
 - Nutritional Care Indicators
 - Physical and Clinical Examination

Overview of

Examination Techniques:

- Four basic techniques are used
 - Inspection
 - palpation
 - Percussion
 - auscultation
- Many signs result from a lack of several nutrients, as well as from non-nutritional causes

Nutritional Tips

- Signs of nutritional deficiencies appear (e.g., skin, hair, teeth, gums, lips, tongue, eyes, and genitalia [in men])
- The hair, skin, and mouth are susceptible because of the rapid cell turnover of epithelial tissue
- Mucosal changes in the GI tract are indicated by problems such as diarrhea and anorexia

Symptoms of Physical Deficiencies

Energy and Protein Requirement Determination

➤ The final component of a nutrition assessment

- **Total Energy Expenditure**
 - BMR 60- 70 %
 - Activity factor 10-20- 35 %
 - Thermal Effect of food 10 %-
 - Stress Factor

Basal Metabolic Rate

- Amount of energy your body burns except :
 - Digesting food
 - Physical Activity
- So is calculated when person
 - who has gone without food for at least 12 hr
 - has been lying down with little movement in a constant temperature environment overnight
- Unpractical

REE / RMR

- the term REE (resting energy expenditure) or RMR (resting metabolic rate) is used.
- The term “resting” refers to measurement conditions where the individual is resting in a comfortable position without any other restrictions
- RMR is usually estimated to be approximately 10% higher than BMR/BEE

Physical Activity (PA)

- Accounts for 15-20%
- Most variable portion of an individual’s energy needs
- Fluctuates depending on the type, time, and intensity of physical activity.

The Thermic Effect of Food

- TEF is estimated to be approximately 10% of an individual’s caloric intake and represents the energy needed for absorption, transport, and metabolism of nutrient intake.

Table 14.2

Factors That Influence the Thermic Effect of Food

Factor	Effects on the Thermic Effect of Food
Type of macronutrient	Fat has the least effect on TEF; protein has the greatest effect.
Meal composition	Consuming all three macronutrients together produces a lower TEF than would be produced by protein or carbohydrates separately.
Fiber content	A high-fiber meal produces a lower TEF.
Age	TEF declines as we age.
Environmental temperature	Consuming a meal in a cold environment increases TEF.
Alcohol	Alcohol consumption increases TEF but reduces TEF if alcohol is consumed in a cold environment.
Intense exercise	TEF is higher following intense exercise.
Training status	Individuals who are trained athletes have a lower TEF than untrained individuals.
Obesity	Obese individuals have a lower TEF than normal-weight individuals.

Source: Adapted from Kang, J. 2008. *Bioenergetics Primer for Exercise Science*. Champaign, IL: Human Kinetics, Inc.

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Body System	Acceptable Appearance	Signs of Malnutrition	Other Possible Causes
Hair	Shiny, firm in scalp	Dull, brittle, dry, loose; falls out (PEM); corkscrew hair (vitamin C)	Excessive hair bleaching, hair loss from aging, chemotherapy, or radiation therapy
Eyes	Bright; clear; shiny; pink, moist membranes; adjust easily to light	Pale membranes (iron); spots, dryness, night blindness (vitamin A); redness at corners of eyes (B vitamins)	Anemia that is unrelated to nutrition; eye disorders; allergies
Lips	Smooth	Dry, cracked, or with sores in the corners of the lips (B vitamins)	Sunburn, windburn, excessive salivation from ill-fitting dentures or various disorders
Mouth and gums	Oral tissues without lesions, swelling, or bleeding; red tongue; normal sense of taste; teeth without caries; ability to chew and swallow	Bleeding gums (vitamin C); smooth or magenta tongue (B vitamins), poor taste sensation (zinc)	Medications, periodontal disease (poor oral hygiene)
Skin	Smooth, firm, good color	Poor wound healing (PEM, vitamin C, zinc); dry, rough, lack of fat under skin (essential fatty acids, PEM, vitamin A, B vitamins); bruising or bleeding under skin (vitamins C and K); pale (iron)	Poor skin care, diabetes mellitus, aging, medications
Nails	Smooth, firm, pink	Ridged (PEM); spoon shaped, pale (iron)	—
Other	—	Dementia, peripheral neuropathy (B vitamins); swollen glands at front of neck (PEM, iodine); bowed legs (vitamin D)	Disorders of aging (dementia), diabetes mellitus (peripheral neuropathy)

Stress Factors

- Hospitalized patients can be hyper metabolic
- Estimation of their energy needs should take this fact into account and should be multiplied by a stress factor

Measurement Of Energy Requirements

- Indirect Calorimetry
 - Most accurate method of measuring REE/RMR in a clinical setting
 - General Principle depends on the measurement of amounts of oxygen and carbon dioxide in both inspired and expired air (VO_2 and VCO_2), and the volume (V) of gas exchanged is equated to known energy constants (specific numbers of kcal per mL of oxygen consumed)

Table 14.1

Factors That Affect Basal Metabolism

Factor	Explanation
Lean body mass	Lean body mass, which is mostly muscle mass, is more metabolically active than fat tissue, so more kilocalories are needed to maintain it. Athletes who have a large percentage of lean body mass due to their increased muscle mass will have a higher BMR than individuals who aren't athletic.
Age	For adults, BMR declines about 1 to 2 percent per decade after the early adult years but it increases by 15 percent during pregnancy. For children, BMR increases during times of rapid growth such as infancy and adolescence.
Gender	Women have less lean body mass, and typically have a higher percentage of body fat than men. This results in women having up to a 10 percent lower BMR. Women also tend to have a smaller body size. (See below.)
Body size	Taller individuals will have a higher BMR due to increased surface area compared with shorter individuals. More surface area means more heat lost from the body, which causes the metabolism rate to increase to maintain the body's temperature.
Genes	Research suggests that genes may affect BMR, as individuals within families have similar metabolic rates.
Ethnicity	African-Americans have BMRs that are about 10 percent lower than those of Caucasians.
Stress	Hormones such as epinephrine, which are released during emotional stress, increase BMR. Physiological stress on the body caused by injury, fever, burns, and infections also causes the release of hormones that raise BMR. Heat loss from the body through wounds, as well as the response of the immune system during infection, increase BMR.
Hormones	An increase in thyroid hormone increases BMR, whereas too little of this hormone lowers BMR. Hormone fluctuations during a woman's menstrual cycle lower BMR during the phase before ovulation.
Starvation	Starvation and fasting for more than about 48 hours lower BMR.
Environmental temperature	Being very cold or very hot can increase BMR. The change is minimal if clothing or air temperature are adjusted.
Caffeine	Caffeine can raise BMR but only slightly when consumed regularly in moderate amounts.
Drugs	Nicotine may increase BMR. Drugs such as amphetamine and ephedrine increase BMR.

*Note: Smoking is not a weight-management strategy. Some people may think that replacing snacks with cigarettes helps them stay slim, but the health risks associated with smoking, such as lung cancer, heart disease, and stroke, make it a foolish habit. Anyone concerned about weight gain when quitting smoking can minimize the chances of this with exercise.

Source: Institute of Medicine. 2002. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Available at www.iom.edu.

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Other Determinations

- Energy Requirements based on Equations
 - Clinicians rely on prediction equations to determine an individual's energy requirement in healthy populations, and in the critically ill
- Energy Requirements based on DRI
 - Individual variation the DRI is not recommended for the energy requirement determination
 - Not practical

Estimation of Protein Requirements

- RDA for Protein
 - Best reference for protein requirements in the non-stressed population
 - For adults, this level is set at 0.8 g protein/kg of body weight
 - The least needed
 - Actual intake is 1.2 gm/kg

Protein Requirements in Other Conditions

- In metabolic stress, trauma, and disease can be met by providing 1.0-1.5 g protein/kg/day
- In heavy physical activity may be increased to reach 2.5 g/kg/day

Calculating BMR and Total Daily Energy Needs

Make it Easy

- A simple and accurate way to estimate your total daily energy needs is to calculate your BMR and then multiply the amount of energy you expend as a result of your activity level.

Example of TEE Expenditure

- First Calculate BMR.:
- If a man:
 - body weight in kgms is multiplied by 1 kcal per kilogram per hour:
 - $1 \text{ kcal/kg body weight/hour} = 79.5 \text{ kg} = 79.5 \text{ kcal/hour}$

- Calculate BMR for the total day (24 hours):
 - 79.5 kcal/hour X 24 hours/day = 1,909 kcal/day
- If a woman:
 - body weight in kg is multiplied by 0.9 kcal/kg body weight/hour.)

Estimate Total Caloric Intake

- Harris Benedict using Age, weight and gender
 - To determine the BMR
We use the modification:
BMR X Activity Factor
 BMR = Females = $\text{Kg} \times 0.9 \times 24 \text{ hrs}$
 Males = $\text{Kg} \times 1 \times 24 \text{ hrs}$

Activity	Factor
No or Little	1.2
Light 1-3 days	1.3
Moderate 3-5 days	1.5
Heavy 6-7 days	1.7
Vigorous twice/day	1.9

Estimate Total Caloric Intake

Objectives

- Assessment of nutritional status
 - Nutritional Care Indicators
 - Biochemical Indicators

Overview

- To know the nutritional implication of each test
- To be able to understand the appropriate laboratory markers to monitor the nutritional disease

Blood Test Levels for Diagnosis of Diabetes and Prediabetes



	A1C (percent)	Fasting Plasma Glucose (mg/dL)	Oral Glucose Tolerance Test (mg/dL)
Diabetes	6.5 or above	126 or above	200 or above
Prediabetes	5.7 to 6.4	100 to 125	140 to 199
Normal	About 5	99 or below	139 or below

Diagnosis of Gestational Diabetes

At 24-28 weeks & at first visit , if at high risk

- 50-gram, 1-hour, glucose challenge test, (modified OGTT)
- If score is 130-140 mg/dL, test again with fasting, & 100-gram, 3-hour OGTT
- Diagnostic if 2 or more +
 - one-hour level of 180 mg per dL
 - two-hour level of 155 mg per dL
 - three-hour level of 140 mg per dL

Vulnerable Groups:

- I. Pregnant
- II. Geriatrics
- III. Children

➤ Pregnancy

- Hemoglobin (indicates anemia)
- Blood grouping and typing
- VDRL (test to detect syphilis)
- ELISA (test to detect HIV)
- Urine investigations
 - Urine albumin
 - Urine sugar (indicates diabetes)
 - Any pus cells (indicates infection)

➤ Anemia of Pregnancy

Causes of Anemia:

- Blood volume increases 50%, Hb falls (25-30 w)
- Iron deficiency in diet eg haemorrhoids
- Lack of folic Acid

Weight Problem Patients:

➤ Overweight

Hormonal studies in teenagers:

- Thyroid function tests
- Cortisol level.

➤ Underweight

- Hormonal:
 - Hyperfunction of thyroid
- Stool Analysis:
 - Occult blood
 - Malabsorption
 - Tumour

- Tumour markers in cachectic

➤ Specimen Types

- Serum
- Plasma
- Erythrocytes, leukocytes
- Whole blood from finger or heel prick that is placed on paper and can be used for selected hormone tests and other tests such as infant phenylketonuria screening.
- **Other Tissues**
 - Urine that contains excreted metabolites,
 - Feces is effective when nutrients are not absorbed or to determine composition of gut flora
- **Less commonly used specimens:**
 - Breath tests: to evaluate nutrient metabolism
 - Hair and nails: to determine exposure to toxic material
 - Saliva: to evaluate adrenal stress and hormones
 - Sweat: to detect sweat chloride levels to determine presence of cystic fibrosis

➤ Nutritional Analysis of Urine Analysis

- **Glycosuria:**
 - Suggests abnormal carbohydrate use Possibly diabetes
- **Acidic:**
 - high-protein diet or acidosis
 - Uncontrolled DM or Starvation
 - Uric acid, cysteine, and calcium oxalate stones
- **Alkaline**
 - Diets rich in vegetables or dairy products
 - Phosphate and calcium carbonate stones.

➤ Assessment of Special Nutritional States

I. Hydration:

Laboratory measures of hydration status include:

- Serum sodium
- BUN
- Serum osmolality
- Urine specific gravity
- BUN & BUN creatinine ratio:
 - increases with hypovolaemia and decreases with hypervolaemia

II. Nitrogen Balance:

Estimate the balance between

- Exogenous nitrogen intake (orally, enterally, or parenterally)
- Removal of nitrogen-containing compounds (urinary, fecal, wound), and other nitrogen sources.

Assessment of Nutritional Anaemia

- Clinical nutritionists must distinguish between anemia caused by nutritional inadequacies and that caused by other factors

I. Iron Deficiency Anaemia

II. Megaloblastic Anaemia

NB Hydration problems can mask nutritional anemias or may result in falsely low blood values

I. Iron Deficiency Anemia

➤ Hemoglobin:

- A better measure than the hematocrit level :
 - Affected by hydration and high leucocytic count.
 - Higher levels in higher altitudes. Lower levels are recorded above the age of 50 years.

➤ Serum Iron

- Decreased & is the measure of circulating iron that is bound to transferrin.
 - Poor index of iron status as of the large diurnal variation, highest being in the morning and lower levels in the midafternoon.

Assessment of Iron Deficiency Anemia

Total Iron Binding Capacity & Transferrin

- The general rule is the increase in TIBC and decrease with transferrin.
- TIBC
 - Increases in those with hepatitis, hypoxia, pregnant women, or those taking oral contraceptives or receiving estrogen replacement therapy.
 - Decreases in those with malignant disease, nephritis, and hemolytic anemias.
- Transferrin may be decreased in those with PEM, fluid overload, and liver disease.
- Ferritin
- Storage protein
- An excellent indicator of the size of the body's iron storage pool in healthy people.
- A positive acute-phase protein & is not a reliable indicator of iron stores in patients with acute inflammation.
- Elevations in ferritin occur 1 to 2 days after the onset of the acute illness and peak at 3 to 5 days.

II. Macrocytic Anemia

▪ Both Vitamin B12 & folate:

- Arrest DNA synthesis.
- Impaired RBC synthesis
- Large, nucleated RBCs are released into the circulation.

▪ Diagnosis of Macrocytic Anemia

- Folate in whole blood
- Vitamin B12 is measured in serum
- Increased Homocysteine:
 - Elevation indicates either genetic defects or deficiency of folic acid or vitamin B12
 - Due to defect in the change of homocysteine to methionine
- Schilling Test:
 - used to detect the defect in vitamin B12 absorption
- Methylmalonic Acid:

- Differentiates between folate and vitamin B12 deficiencies in urine or serum.

Assessment of Malabsorption

➤ **Fecal fat to detect occult blood or non absorbed nutrients**

➤ **Fat Soluble Vitamins:**

- **Vitamin A:**
 - **Estimated using serum retinol.**
 - **Deficiency result from:**
 - Inadequate intake
 - Fat malabsorption
 - Liver disorder
 - Common in prolonged PEM.
- **Vitamin D**
 - **Estimated by plasma 25-hydroxy vitamin D levels.**
 - **Deficiency may be caused by:**
 - Inadequate dietary intake,
 - Inadequate exposure to sunlight,
 - Malabsorption & obesity
 - Related to many diseases.
 - **Deficiency of vitamin D can also lead to secondary malabsorption of calcium.**

Water Soluble Vitamins

- **Vitamin B12 and folate are commonest in adults.**
- **Thiamin deficiency associated with**
 - chronically consumption of high levels of alcohol
 - persistent vomiting,
 - impaired absorption because of disease or surgery.

Thiamin diphosphate in whole blood is measured because plasma and serum levels reflect recent dietary change

Chapter 6

Nutritional Assessment in Pregnancy, Pediatrics and Adolescence

Objectives

- Nutrition assessment in Pregnancy
- Nutrition Recommendations
- Issues of Concerns

Overview

Introduction

A woman's nutritional status should be assessed pre-conceptionally with the goal of optimizing:

- Maternal
- Fetal
- Infant health

Pregnancy-related dietary changes should begin prior to conception, with appropriate modifications across pregnancy.

Nutritional Advice For Pregnant Women Bases

1990 Institute of Medicine (IOM) Pregnancy Report,
2005 US Dietary Guidelines
2006 IOM publication:

Assessment of Nutritional Status

Best:

In a team approach

- Obstetrician
- A trained professional in prenatal nutrition counseling and education

For both:

- Screening
- Assessment

Elements of Assessment

1- History:

- Obstetric, medical
- Substance abuse

- Vitamin & Mineral
- Food avoidances, special diets, skipping meals
- Dieting history, weight fluctuations, eating disorders
- Food resources

2- Physical Examination:

- BMI:
 - Ask about last menstrual period and use this weight for baseline calculations.
 - A prepregnancy BMI of 19.8 to 26.0 is normal.
- Screen for signs of nutritional deficiency or medical disease

Objectives

- Pediatric Nutrition Assessment
- Principle Approaches
- Biochemical Assessment
- Abnormal Nutrition

Overview of

Nutritional Disorders Assessment of nutritional status

- Nutritional assessment is the evaluation of an individual's nutritional status & requirements. It can detect under or malnutrition.
- There are 5 principle approaches to nutritional assessment: ***Dietary, clinical, anthropometric, biochemical & immunological.***

1. Dietary assessment: Assessment of the quantity and quality of food consumed in comparison with the individual needs according to age and sex.

2. Clinical assessment:

a. Good history taking with 24 hours dietary recall.

b. Thorough clinical examination to:

- *Detect signs of macro & micronutrient deficiency.
- *Determine the type & degree of nutritional disorder.
- *Detect physical findings of associated conditions.
- *Determine specific deficiencies & complications.

c. Anthropometric nutritional assessment: (Revise G & D chapter)

Weight for age (W.F.A.):

- A low WFA (less than 5th centile of the reference population) is a good index for acute illness.
- Presence of a flat (Plateau) curve is an alarm sign of nutritional disorder

Height for age: (H.F.A.):

*A low HFA (less than 5th centile of the reference population) indicates stunting that occurs due to chronic malnutrition.

Weight for height: (W.F.H.):

*Low WFH index indicates wasting due to acute severe growth retardation.

*WFH is the optimal anthropometric index to assess childhood

malnutrition.

Mid-arm circumference:

Skin fold thickness: It is an indicator of SC fat which indicates fat reserve and is a good indicator for obesity

Chest circumference/head circumference ratio:

Biochemical nutritional assessment:

Serum albumin: Low serum albumin can be an indicator of inadequate protein intake

Essential amino acids: In long term PEM the level of essential amino acids will fall starting by the branched amino acids; leucine, isoleucine and valine.

Serum transferrin: Indicates protein depletion before serum albumin changes.

Serum prealbumin: Half-life 48 hours. It is the first blood protein to be significantly decreased as a result of borderline malnutrition.

Serum fibronectin: It is a glycoprotein of short half-life (9hours).

Serum somatomedin C: Half-life 2hours. Normalizes within 3 to 5 days of therapy.

Immunological assessment:

- Immunocompetence is a sensitive index of the nutritional status.
- Alteration in immune response may precede any decrease in the rate of weight gain & is seen in varying degrees even in children with marginal malnutrition.

Objectives

- Nutrition assessment in Adolescence

Overview of

Changes in height, weight and body composition during adolescence

The time and tempo of changes in height, weight and body composition can vary greatly between and among adolescents.

Changes in height

- 15-20% of adult height is gained during adolescence.
- Growth spurt starts later in boys than girls and has a higher peak velocity than in girls. Linear growth can be slowed or delayed in adolescence if diet is severely restricted in energy or energy expenditure is increased as in highly competitive athletes.

Changes in weight

- 25-50% of final adult ideal weight is gained during adolescence.
- The timing and amount of weight gain can be greatly affected by energy intake and energy expenditure.

Changes in body composition and skeletal mass

- In the pre-pubertal period the proportion of fat and muscle in boys and girls is similar, and lean body mass is equal in both sexes.
- Growing boys gain proportionately more muscle mass than fat, and more lean

body mass as compared to girls.

- As adults the normal percentage of body fat is about 23% for women and 15% for men.
- Approximately 45% of skeletal mass is added during adolescence. By the end of the second decade of life, 90% of total bone mass is gained.
- Females with delayed puberty fail to gain bone mass at a normal rate and show lower mineral density as adults. Nutrition is one of the environmental factors that determines onset of puberty.
- The pubertal growth can be monitored by using height-for-age, weight-for-age and body mass index (BMI)-for-age (weight/ height²).

Body Mass Index (BMI)

Body Mass Index (BMI) is an anthropometric index of weight and height that is defined as body weight in kilograms divided by height in meters squared

$BMI = \text{weight (kg)} / \text{height (m)}^2$

BMI is the commonly accepted index for classifying adiposity in adults and it is recommended for use with children and adolescents.

BMI is used differently for children than it is for adults.

In children and teens, body mass index is used to assess underweight, overweight, and risk for overweight. Children's body fatness changes over the years as they grow. Also, girls and boys differ in their body fatness as they mature. This is why BMI for children, also referred to as BMI-for-age, is gender and age specific. BMI-for-age is plotted on gender-specific growth charts. These charts are used for children and teens 2 - 20 years of age.

See attached charts

Source:

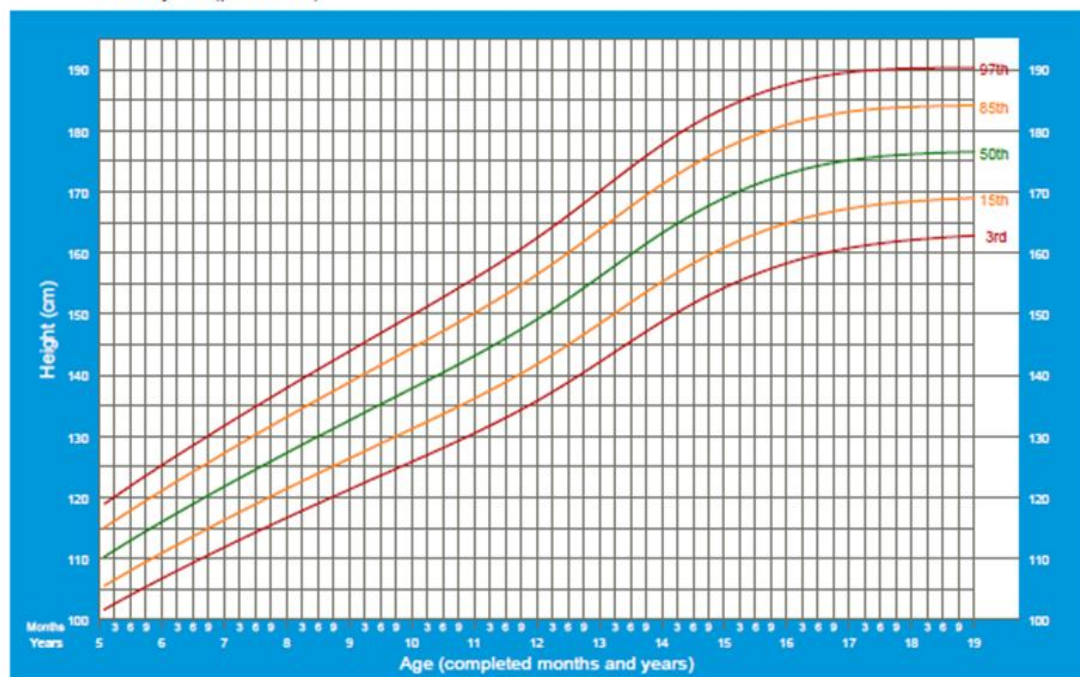
<https://www.cdc.gov/growthcharts/data/set1clinical/cj41c023.pdf>

<https://www.cdc.gov/growthcharts/data/set1clinical/cj41c024.pdf>



Height-for-age BOYS

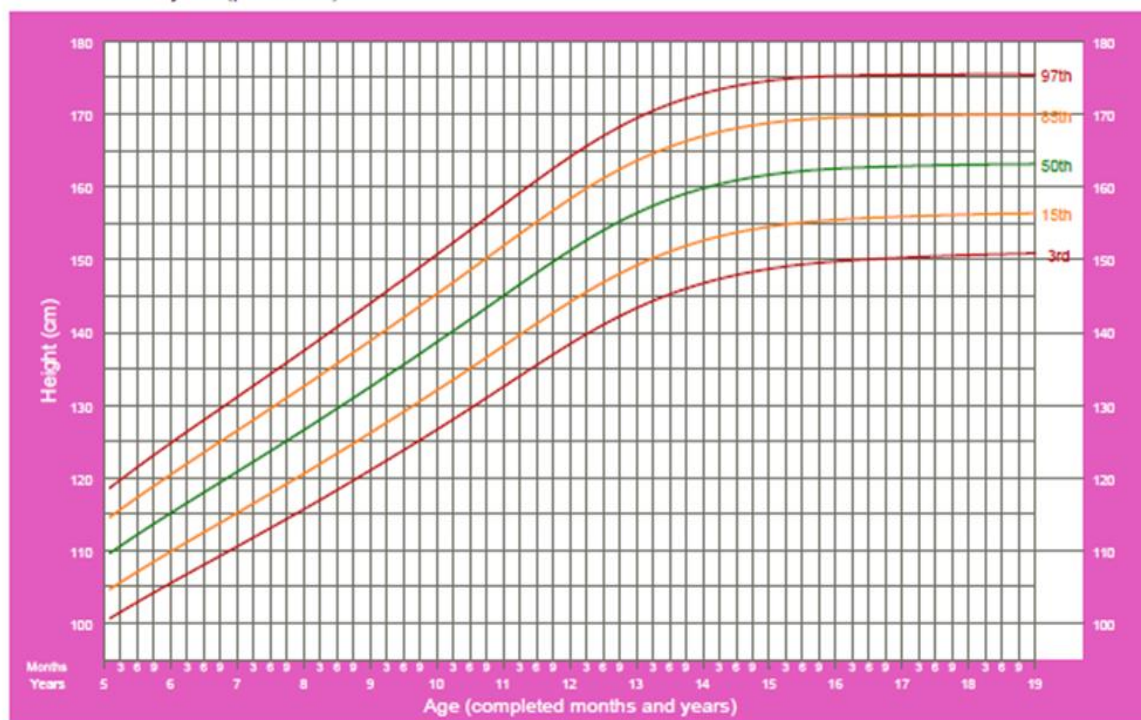
5 to 19 years (percentiles)



2007 WHO Reference

Height-for-age GIRLS

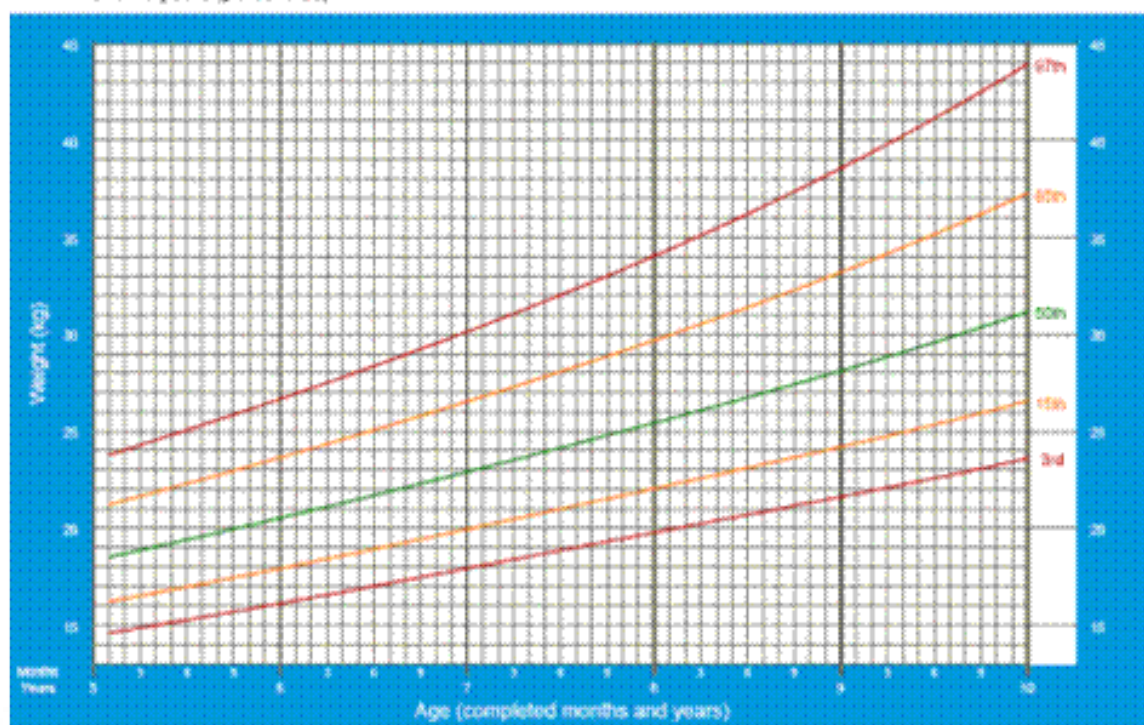
5 to 19 years (percentiles)



2007 WHO Reference

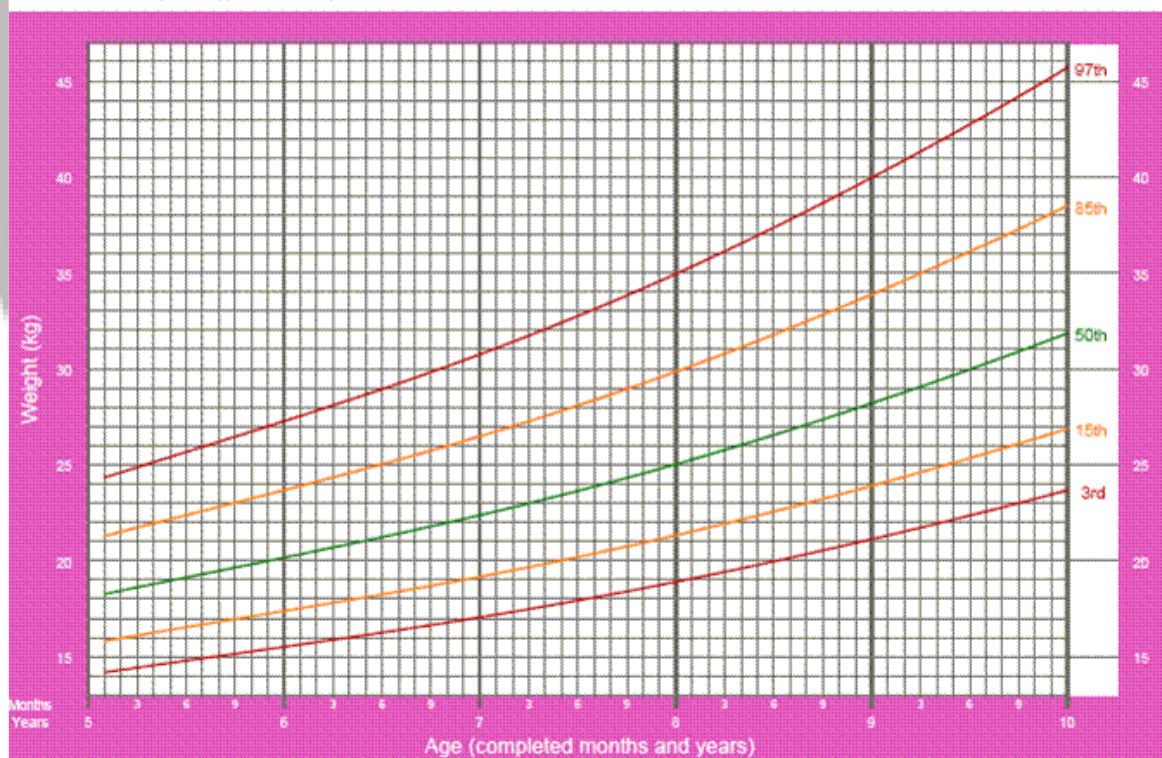
Weight-for-age BOYS

5 to 10 years (percentiles)



Weight-for-age GIRLS

5 to 10 years (percentiles)



Chapter 7

Nutritional Assessment in Geriatrics

Objectives

Special Nutritional Assessment in Geriatrics

- The Malnutrition Universal Screening Tool (MUST)
- Mini Nutritional Assessment (MNA),

Overview of

Nutrition assessment is defined as the evaluation of individuals based upon appropriate dietary data, anthropometric, physical, and biochemical to determine nutrient needs and recommended appropriate nutrition intake including enteral and parenteral nutrition”.

Nutrition Assessment and Screening

Screening is an essential tool before proceeding to nutritional assessment. It is always better to **detect** and **prevent** problems early by screening than discover serious problems later.

When to Screen individuals?

On admission to care homes

On registration at General Practitioner Upon clinical concern

Other opportunities - health checks, flu injections

- It is required that all patients receive nutrition screening within 48 hours of their admission to a hospital.

Screening and Assessment Tools

1. Nutritional Risk Index, for screening
2. Subjective Global Assessment
3. **Malnutrition Universal Screening Tool (MUST)**
4. Nutrition Risk Screening
5. **MNA for elderly**

Nutritional Tips:
For more efficient and cost effectiveness collection:

- Screening can be performed by a trained personnel
- Assessment is performed by nutritionist

Malnutrition Universal Screening Tool (MUST)

THE 'MUST' was developed by the Malnutrition Advisory Group (MAG) to identify/categorize those people at risk of malnutrition. 'MUST' has been evaluated in hospital wards, outpatient clinics, general practice, the community and in care homes and is easy to use, rapid, reproducible and internally consistent. The 'MUST' is also referred to in the NICE clinical guideline on nutrition support and has therefore been included in these guidelines as the preferred screening tool.

www.bapen.org.uk.



Step 1

BMI score

BMI kg/m ²	Score
>20 (>30 Obese)	= 0
18.5-20	= 1
<18.5	= 2

+

Step 2

Weight loss score

Unplanned weight loss in past 3-6 months	
%	Score
<5	= 0
5-10	= 1
>10	= 2

+

Step 3

Acute disease effect score

If patient is acutely ill **and** there has been or is likely to be no nutritional intake for >5 days
Score 2

If unable to obtain height and weight, see reverse for alternative measurements and use of subjective criteria

Acute disease effect is unlikely to apply outside hospital. See 'MUST' Explanatory Booklet for further information

Step 4

Overall risk of malnutrition

Add Scores together to calculate overall risk of malnutrition
Score 0 Low Risk Score 1 Medium Risk Score 2 or more High Risk

Step 5

Management guidelines

0 Low Risk Routine clinical care

- Repeat screening
Hospital – weekly
Care Homes – monthly
Community – annually for special groups e.g. those >75 yrs

1 Medium Risk Observe

- Document dietary intake for 3 days
- If adequate – little concern and repeat screening
 - Hospital – weekly
 - Care Home – at least monthly
 - Community – at least every 2-3 months
- If inadequate – clinical concern – follow local policy, set goals, improve and increase overall nutritional intake, monitor and review care plan regularly

2 or more High Risk Treat*

- Refer to dietitian, Nutritional Support Team or implement local policy
- Set goals, improve and increase overall nutritional intake
- Monitor and review care plan
Hospital – weekly
Care Home – monthly
Community – monthly
- * Unless detrimental or no benefit is expected from nutritional support e.g. imminent death.

All risk categories:

- Treat underlying condition and provide help and advice on food choices, eating and drinking when necessary.
- Record malnutrition risk category.
- Record need for special diets and follow local policy.

Obesity:

- Record presence of obesity. For those with underlying conditions, these are generally controlled before the treatment of obesity.

Re-assess subjects identified at risk as they move through care settings

See The 'MUST' Explanatory Booklet for further details and The 'MUST' Report for supporting evidence.

© BAPEN

The Elderly: Mini Nutritional Assessment-MNA

The purpose of MNA is to detect the presence of undernutrition and the risk of developing under nutrition among the elderly in home-care programmes, nursing homes and hospitals. The prevalence of undernutrition among the elderly may reach significant levels (15-60%).

Nutrition Status Assessment

- As a component of the nutritional care process, the nutrition assessment consists of:
 - Gathering the data in the following areas:
 - Personal history
 - Food and nutrition related history
 - Anthropometric measurements
 - Nutrition-focused physical findings
 - Biochemical data, medical tests and procedure
- Analysis of data, so that current and potential nutritional problems can be identified.

Subjective and Objective Data Collection

Types of data include both subjective and objective information.

- **Subjective Data:** include information, usually obtained during interviews, coming directly from the patient, family members, or significant others. Thus, subjective data would include the patient's perception of his medical condition, dietary intake, lifestyle conditions, current medications or supplement Intake, and family medical history. Subjective data also include the interviewer's observations

Examples of Subjective Food/Nutrition-Related History Assessment

Category	Specific Examples
Food and nutrient intake	Mother reporting child's food intake for previous 24 hours.
Medication and herbal intake	Patient reporting current medications.
Knowledge/beliefs/attitudes	Patient stating that he avoids "sweets and desserts" as his diet modification for diabetes.
Behavior	Patient decides that he will eat only while sitting at kitchen table with family members.
Factors affecting access to food and food-/ nutrition-related supplies	Patient reports that he only has access to microwave and does not have a stove or oven.
Physical activity and function	Patient is unable to perform more than 10 minutes of walking physical activity.
Nutrition-related patient-centered measures	Patient voices that she sees no benefit of improving blood glucose levels.

- o **Objective Data** include information obtained from a verifiable source such as the current medical record and previous medical histories. These data could include anthropometric measurements, biochemical data, and medical tests and procedures.

Objective Nutrition Assessment

Information with Examples

Anthropometric Data

- Height
- Weight
- BMI
- Weight changes in 1 month
- % Usual Body Weight for six months

Nutritional Focused Physical Findings

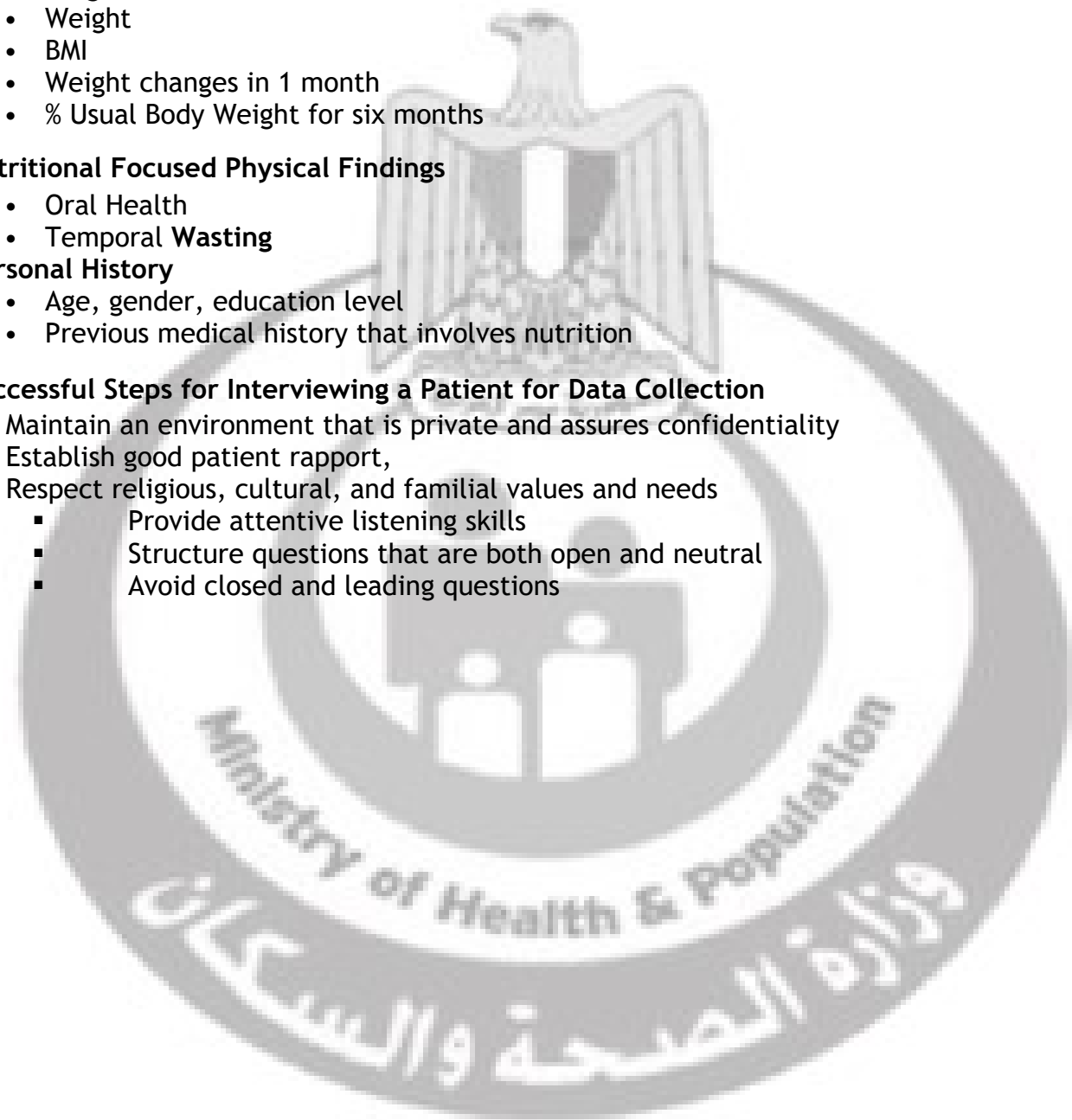
- Oral Health
- Temporal **Wasting**

Personal History

- Age, gender, education level
- Previous medical history that involves nutrition

Successful Steps for Interviewing a Patient for Data Collection

- Maintain an environment that is private and assures confidentiality
- Establish good patient rapport,
- Respect religious, cultural, and familial values and needs
 - Provide attentive listening skills
 - Structure questions that are both open and neutral
 - Avoid closed and leading questions



Chapter 8

Nutritional Planning I - Tools for a Healthful Diet

Objectives

- Identify the principles of healthy eating
- Define dietary standards of the Dietary Reference Intake and explain their uses.
- List major food groups and identify foods that are typically in each group

Overview of healthy diet and various food groups

What Is A Healthy Diet?

To “consume a *variety* of foods *balanced* by a *moderate* intake of each food”

- Eating to maintain health and prevent disease
- It involves the key principles of:
 - Adequacy
 - Balance
 - Variety
 - Moderation

Healthy Eating Principles

- **Adequacy and Balance:**
 - Diet that provides all the essential nutrients, fiber, and energy
 - Diet that provides the correct proportion of nutrients: contains the right combinations of foods to provide the proper balance of nutrients.
 - Inadequacy → Undernutrition → Malnutrition
 - Overnutrition → Overweight and Obesity
- **Variety**

Diet that contains a mixture of different food groups and foods within each group, inclusion of phytochemicals.

- **Moderation**

Diet that provides reasonable but not excessive amounts of foods and nutrients. Plan your intake, control portion size and number of servings. Moderation refers mostly to portion size.

WHO has set a list of dietary recommendation for promoting a healthy diet and life style¹

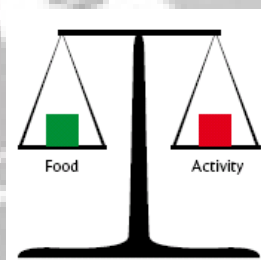
These recommendations are:

1. Maintain a healthy body weight
2. Be active
3. Limit intake of fats and oils
4. Limit intake of sugars
5. Limit salt intake
6. Eat a variety of foods every day
7. Eat cereals, preferably whole grains
8. Eat more vegetables and fruit every day
9. Eat legume based dishes regularly
10. Eat fish at least twice a week
11. Consume milk/dairy products daily (preferably low fat)
12. Choose poultry and lean meat
13. Drink lots of clean water
14. Eat clean and safe food

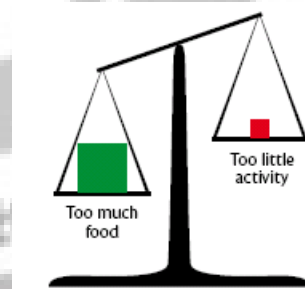
http://www.who.int/nutrition/publications/nutrientrequirements/healthydietguide2012_emro/en/index.html

1. Maintain a healthy body weight

Body Mass Index (BMI) shows if weight is adequate for height and is obtained by dividing weight in kilograms by height in metres squared. $BMI = \text{Weight in Kg} / \text{Height in m}^2$



Weight stable



Weight increase

Table 1.1 Weight classifications according to BMI

BMI value (kg/m ²)	
Less than 18.5	Low weight
18.5-24.9	Average weight
25-29.9	Overweight
More than 30	Obese

2. Be active

The aim is to encourage regular physical activity for all age groups. Being physically active is important to prevent heart disease and stroke. To improve overall

cardiovascular health, the American Heart Association (AHA) suggests at least 150 minutes per week of moderate exercise or 75 minutes per week of vigorous exercise (or a combination of moderate and vigorous activity). Dec 14, 2017

Types of physical activity

- Moderate intensity: brisk walking, cycling, weight-lifting, dancing
- High intensity: swimming, running/jogging, soccer, tennis, basketball, fast walking

American Heart Association (AHA) Recommendation for physical activity for adults (Dec. 2017)²

For Overall Cardiovascular Health:

- At least **30 minutes of moderate-intensity** aerobic activity at least **5 days per week for a total of 150**
- OR**
- At least **25 minutes of vigorous** aerobic activity at least **3 days per week for a total of 75 minutes**; or a combination of moderate- and vigorous-intensity aerobic activity
- AND**
- **Moderate- to high-intensity muscle-strengthening activity** at least **2 days per week** for additional health benefits.

http://www.heart.org/HEARTORG/HealthyLiving/PhysicalActivity/FitnessBasics/American-Heart-Association-Recommendations-for-Physical-Activity-in-Adults_UCM_307976_Article.jsp#.W13SPdUzblU

3. Limit intake of fats and oils

The aim is to limit the intake of total fat, particularly saturated fat, by replacing animal and hydrogenated fats with vegetable oils, such as olive oil and canola oil, as well as increasing the intake of omega-3 fatty acids through the regular consumption of nuts and fish.

4. Limit intake of sugars

High intakes of sugar compromise the nutrient quality of diets by providing significant energy without essential nutrients. High sugar consumption is associated with many health risks and result in unhealthy weight gain.

Foods and drinks that contain the most added sugar in diets of the Arab Region

- Regular soft drinks
- Sweetened fruit drinks (e.g. *jellab*, *tamr hindi*, *amar il deen*)
- Cakes and pastries
- Cookies such as sesame cookies (*barazii'*)
- Arabic sweets (e.g. *baklava*, *knafeh*, *qashta*, *katayef*, *malban*, *umm ali*, *ma'amounia*, *basbousa*)
- Sweetened jams
- Milk-based desserts and products (e.g. *muhallabiya*, *mughli*, *riz bi haleeb*, *sahlab*, *halawa halib*)
- Halaweh

5. Limit salt intake

The aim is to encourage the reduction of salt in the diet.



- **Consume less than 2300 mg of sodium per day** (i.e. 1 teaspoon or 5 g salt per day)
- **Special population groups:** Individuals with hypertension, middle-aged and older adults should aim to consume no more than 1500 mg of sodium per day and should consume potassium-rich foods, such as fruits and vegetables.

Table 5.1 Range for sodium content in selected foods (USDA, 2005)

Food group	Serving size	Range (mg)
Pizza, plain, cheese	115 g	450–1200
Tomato juice	240 g (about 1 cup)	340–1040
Potato chips	30 g	120–180
Breads, all types	30 g	95–210
Frozen vegetables, all types	½ cup	2–160

Note: Iodized salt is important for growth and brain development.

6. Eat a variety of foods every day

A diet based on a wide range of foods may ensure that essential nutrients are supplied in adequate amounts and may protect against vitamin and mineral deficiencies, as well as some chronic non-communicable diseases.

The aim is to ensure that the diet contains adequate amounts of essential nutrients, such as vitamins, minerals and phytochemicals. Promote the consumption of nutrient-dense foods rather than unhealthy calorie-rich, nutrient-depleted foods.

Box 6.1 Key recommendations

- Choose a variety of vegetables from all vegetable subgroups (e.g. dark green, orange, legumes, starchy vegetables) several times per week.
- Choose from the different fruit groups (e.g. citrus, berries, melons, stone fruits).
- Consume wholegrain products every day.
- Consume 3 cups per day of fat-free or low-fat milk, or low-fat milk products such as *labneh*, yogurt, *muhallabiya* or low-salt yogurt drink.
- Choose nutrient-dense foods from each food group and decrease intake of less nutrient-dense foods to stay within energy needs.
- Limit the consumption of foods that are rich in added sugar, saturated fats (i.e. animal fat) and trans fats, which are typically foods of low nutrient density.
- Select low-fat varieties within each food group; this helps avoid overconsumption of energy and food components such as total fat, saturated fat and cholesterol.

7. Eat cereals, preferably whole grains

The aim is to emphasize the importance of cereals as a major component of the diet and to encourage consumption of wholegrain cereals, which generally are higher in dietary fibre and have a lower glycaemic index (GI) (see box below). Cereals and cereal-based products are among the principal staple foods in most countries. Lower GI diets may possibly be protective against both diabetes and heart disease and may help with weight control.

For a healthy diet, the greatest proportion of food should come from wholegrain breads, cereals, rice, pasta and noodles.

••It is recommended to consume six servings of cereals per day. **Recommended intake (based on a 2000 kcal [8.4 MJ] diet)**

Box: Glycaemic index of foods

Low GI foods (GI value of 55 or less)

- 100% stone-ground whole-wheat bread
- heavy mixed-grain bread
- bran cereals
- parboiled or converted rice
- bulgur
- pasta/noodles
- sweet potato
- legumes: lentils, chickpeas, kidney beans,,,

Medium GI foods (GI value of 56–69)

- Whole-wheat bread
- basmati rice
- brown rice
- couscous
- sweet corn
- popcorn.

High GI foods (GI value of 70 or more)

- white bread
- bran flakes/corn flakes
- short-grain rice
- baked potato
- French fries
- *ka'ak*.

8. Eat more vegetables and fruit every day

The aim is to promote the consumption of fruits and vegetables. Regular consumption of fruit and vegetables is associated with a substantially lower risk of many diseases as coronary heart disease, stroke, several major cancers, type 2 diabetes mellitus, cataract and macular degeneration of the eye, and possibly hypertension. The protective effects of these foods are mediated through numerous beneficial nutrients, including antioxidants, vitamins, minerals, phytochemicals and fibre.

Recommended daily intake (based on a 2000 kcal [8.4 MJ] diet)

- 2 cup equivalents of fruits; and
- 2 ½ cup equivalents of vegetables.

1 cup equivalent of fruit equals:

- 1 cup (240 ml) 100% fruit juice
- ½ cup dried fruits (e.g. raisins, prunes, apricots)
- 1 small apple
- 1 small banana
- 32 grapes
- 8 large strawberries
- 1 large orange
- 1 large peach
- 1 medium pear
- 1 small wedge of watermelon

1 cup equivalent of vegetables equals:

- 1 cup cooked spinach
- 1 cup green peas
- 1 cup cooked zucchini
- 1 cup cooked or raw mushrooms
- 1 cup cauliflower
- 2 medium carrots
- 1 cup cucumber, sliced
- 1 large tomato
- 2 cups raw leafy greens (e.g. endive, romaine, iceberg lettuce)



9. Eat legume based dishes regularly

Legumes are rich sources of carbohydrates, vegetable protein, dietary fibre, oligosaccharides, phytochemicals and minerals, including iron.

10. Eat fish at least twice a week

The aim is to promote the consumption of fish at least twice a week. Fish, particularly oily fish, is a very rich source of omega-3 polyunsaturated fats.

Examples of Omega-3 sources:

- fish such as salmon, trout, herring
- plant sources (e.g. walnuts, flaxseed, purslane, soybean oil, canola oil).

11. Consume milk/dairy products daily (preferably low fat)

12. Choose poultry and lean meat

- Meat and poultry are the best sources of high-quality dietary protein and are valuable sources of essential micronutrients, including iron, zinc and vitamin B12.

- Avoid the consumption of luncheon meats, smoked cold meat cuts (e.g. jambon, basterma), sausages (e.g. makanik) and canned meat as these can be high in salt and fat and carcinogenic compounds (nitrates).
- Recent evidence has shown the carcinogenic effects of consumption of processed meat (IARC Monographs Programme, 2015)³. It is classified as carcinogenic to humans (Group 1), based on sufficient evidence, causing colorectal cancer

What is the processed meat?

Processed meat refers to meat that has been transformed through salting, curing, fermentation, smoking, or other processes to enhance flavour or improve preservation. Examples of processed meat include: hot dogs (frankfurters), ham, sausages, corned beef, and biltong or beef jerky as well as canned meat and meat-based preparations and sauces³.

13. Drink lots of clean water

The aim is to encourage and promote fluid and water intake among all individuals and age groups in the population. Drink water with meals.

Adequate intake is set at:

- 3.7 litres for men
- 2.7 litres for women

14. Eat clean and safe food

Key recommendations for safer food will be studied in Chapter 10

Food constituents

Major food groups and foods in each group

Macronutrients	Micronutrients
• Carbohydrates, fats, and proteins. • They are the only nutrients that provide energy. • Our body needs relatively large amounts of them to grow, build our bodies and regenerate any damage	• Nutrients needed in relatively small amounts to support normal health and body functions as: • Vitamins and minerals - Vitamins as A,B,C,D,E - Minerals as Calcium, iron, chromium, copper, iodine, iron, selenium, zinc.

¹Adapted from: Promoting a healthy diet for the WHO Eastern Mediterranean Region: user-friendly guide World Health Organization 2012 http://www.who.int/nutrition/publications/nutrientrequirements/healthydietguide2012_emro/en/index.html

²American Heart Association Recommendations for physical activity for adults, Dec.2017

³Adapted from: IARC Monographs evaluate consumption of red meat and processed meat October 2015

http://www.iarc.fr/en/media-centre/pr/2015/pdfs/pr240_E.pdf

Major food groups

1. Carbohydrates

- They are classified into sugars (mono and disaccharides) and starches (polysaccharides).
- Monosaccharides:
 - Mainly glucose (in fruits, sweet corn, corn syrup, and honey)
 - Fructose is the sweetest naturally occurring sugar (in honey and fruits)
- Disaccharides: sucrose, lactose and maltose
- Polysaccharides: starch, fibers and glycogen
- **Sources:**
 - All carbohydrates are of plant origin, except lactose (milk sugar), and glycogen (animal starch). Foods containing sugar or starch: Cereal grains, pulses, potatoes, sweet potatoes, bananas, dates, honey, molasses and dried fruits.
- **Recommended intake:** Carbohydrates form the greater bulk of average diet. Carbohydrates of balanced diet give around 45 to 60 % of daily energy requirement.

2. Proteins

- Protein is a nitrogenous compound made of a number of amino acids. Proteins are classified into high and low biological value:
 - High biological value protein: All animal proteins are of high biological value except Gelatin, while Low biological value protein: All plant proteins are of low biological value except soybeans.
 - Amino acids are classified into essential and non essential amino acids.
Essential amino acids: cannot be synthesized by the body and need to be provided by diet.
Non essential amino acids: Can be synthesized by the body when missed in the diet.
- **Sources of proteins:**
 - Animal foods: milk and dairy products, eggs, meat and organ meat.
 - Plant foods: pulses (dried beans, peas, lentils) are the main sources. Cereals (grains, flour, rice). Peanuts and nuts are good sources.
 - Vegetarians get all of their essential amino acids by combining foods with different incomplete proteins to provide adequate amounts of all the essential amino acids. This dietary practice is called protein complementation.
- **Daily requirements:** 10- 15 % of total daily energy (0.8 grams/kg body weight).

3. Fats

- **Sources:** animal and plant

Saturated Fats: Palm oil, full cream milk and cheese, egg yolk, butter.

Unsaturated fats, obtained from:

- a. Monounsaturated Fats (source of Omega 9): olives, avocado, peanuts, and almonds.
 - b. Polyunsaturated Fats
 - Omega 6: corn oil and sunflower oil.
 - Omega 3: Sardines, salmon, mackerel, flaxseed, walnut and soybean
- **Recommended intake:** 20% - 35% of total of daily energy requirement:
 - **Saturated fat**—intake should be $\leq 10\%$ of total calories; people who already have heart disease should consume $< 7\%$ of total calories as saturated fats.
 - **Trans fat***—intake should be $< 1\%$ of total calories.
 - **Omega-3 (v-3) fatty acid**—consume fish at least twice weekly; people with heart disease or elevated blood triglyceride should consume more.
 - **Cholesterol**—limit to 300 mg/day in healthy subjects; people with heart disease should consume ≤ 200 mg/day; those with very high levels of blood cholesterol should consider reducing intake even more.

*Trans fat is produced commercially via a process called partial hydrogenation (formed when margarine is processed). They are found in many foods example hydrogenated margarines, biscuits, cakes and cookies.

Antioxidants:

- Antioxidants protect the body against the hazards of the free radicals and other oxidants that play a role in the etiology of different degenerative diseases.
- The antioxidant defense of the body is through enzymatic system that reacts with the harmful oxidizing chemicals and diminishes their concentrations in the body.
- Trace elements (as selenium, copper, zinc and magnesium) rich in vitamins (vitamin A, C and E) play a role in maintenance of these enzymes.
- Dietary antioxidants are present in fresh fruits and vegetables:
 - Carotenoids other than β carotene: tomatoes and leafy vegetables.
 - Polyphenols : it is present in tea (especially green tea), in apples and onions

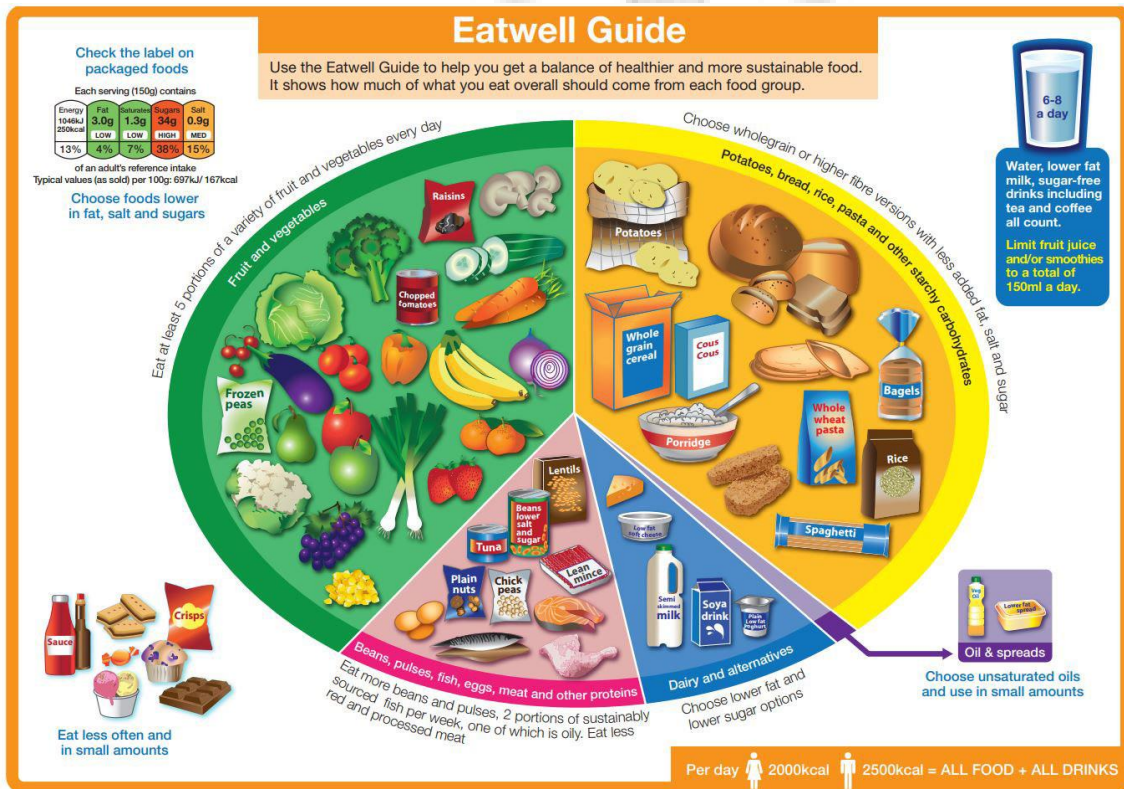
Nutrition Guidelines:

Five major food groups are:

1. Milk and other dairy
2. Meat and meat substitutes
3. Vegetables
4. Fruits
5. Bread, cereal, rice, pasta

Different types of food

- The Eatwell Guide can help you to understand the different types of food that make up a healthy diet. It also shows how much of these foods you should eat to have a well-balanced and healthy diet. It's a good idea to try to get this balance right throughout the week.
- The Eatwell Guide is made up of five food groups - fruit and vegetables; bread, rice, potatoes and other starchy foods; meat, fish, eggs, beans and other non-dairy sources of protein; milk and dairy foods; and oil and spreads. If you choose a variety of foods from the groups you can easily achieve this healthy balance. Foods high in fat, salt and sugars are not needed in the diet, so if you do choose to include them then try to have them less often.



1. Five portions of fruit and vegetables each day and remember, fresh, frozen, dried and canned all count towards your total 5-a-day. Don't forget to include the vegetables you add to cooked dishes, for example onions in a stew or casserole, tomatoes in a pasta sauce or vegetable soup are included.

2. Potatoes, bread, rice, pasta and other starchy carbohydrates - include starchy foods such as chapattis, breakfast cereals, noodles and oats as part of your meals/ snacks. Aim to include one food from this group at each meal time and eat regularly. Try and opt for whole grains where possible.

3. Variety - choose a variety of different types and colors of fruit and vegetables. As well as providing vitamins, minerals and fibre, the natural colors and flavors of plants add powerful antioxidants to our diet.

4. Beans, pulses, fish, eggs, meat and other proteins - choose lean meat or remove excess fat and remove the skin from chicken. Avoid frying where possible. Try to include two portions of fish each week, one of which should be an oily fish (darker skinned), for example: mackerel, trout, sardines, kippers or fresh tuna.

5. Dairy and alternatives - with dairy foods providing the richest and best absorbed source of dietary calcium, try for three portions a day to meet most calcium needs. A portion is:

- a small pot of yoghurt
- 1/3 pint of milk
- a small matchbox size piece of cheese. Try to choose reduced fat versions where you can, for example semi-skimmed milk or low fat yoghurt

6. Oils and Spreads - try to choose low-fat spreads and use a small amount. Opt for one that is low in saturated fat and made from olive, sunflower, rapeseed or vegetable oils. Saturated fat increases the low density lipoproteins (LDL) or 'bad' cholesterol in your blood which can lead to heart disease.

Choosing mono-unsaturated spreads (such as those made from olive or rapeseed oils) help to lower blood levels of harmful LDL cholesterol, and boost levels of 'good' high density lipoproteins (HDL) cholesterol. It is important to remember that all types of fat are high in energy and should be limited in the diet.

7. Sugar and fat - are high in calories, so try to cut down on foods and drinks with lots of sugar/fat in such as sweets, cakes, crisps and sugary soft drinks. Choose low-fat or reduced sugar foods where possible.

Saturated fat (avoid)	Unsaturated fat (alternative)
• butter	Polyunsaturated fat
• ghee	Polyunsaturated fat, oils, soft spreads and margarines including:
• lard	• sunflower
• coconut oil	• soya
• palm oils	• corn
and foods made from these:	• linseed (flaxseed)
• pastries	• safflower
• cakes	• fish oil
• biscuits	Monounsaturated fat:
and other foods made from hydrogenated fats.	• olive oil
•	• rapeseed oil

Summary: Eat a range of foods from the main food groups to make sure you have a balanced diet. Eat the right amount of food for how active you are.

Resources for Planning a Healthy Diet

1. Dietary Reference Intakes (DRIs)
2. Dietary Guidelines for Americans
3. MyPyramid
4. MyPlate

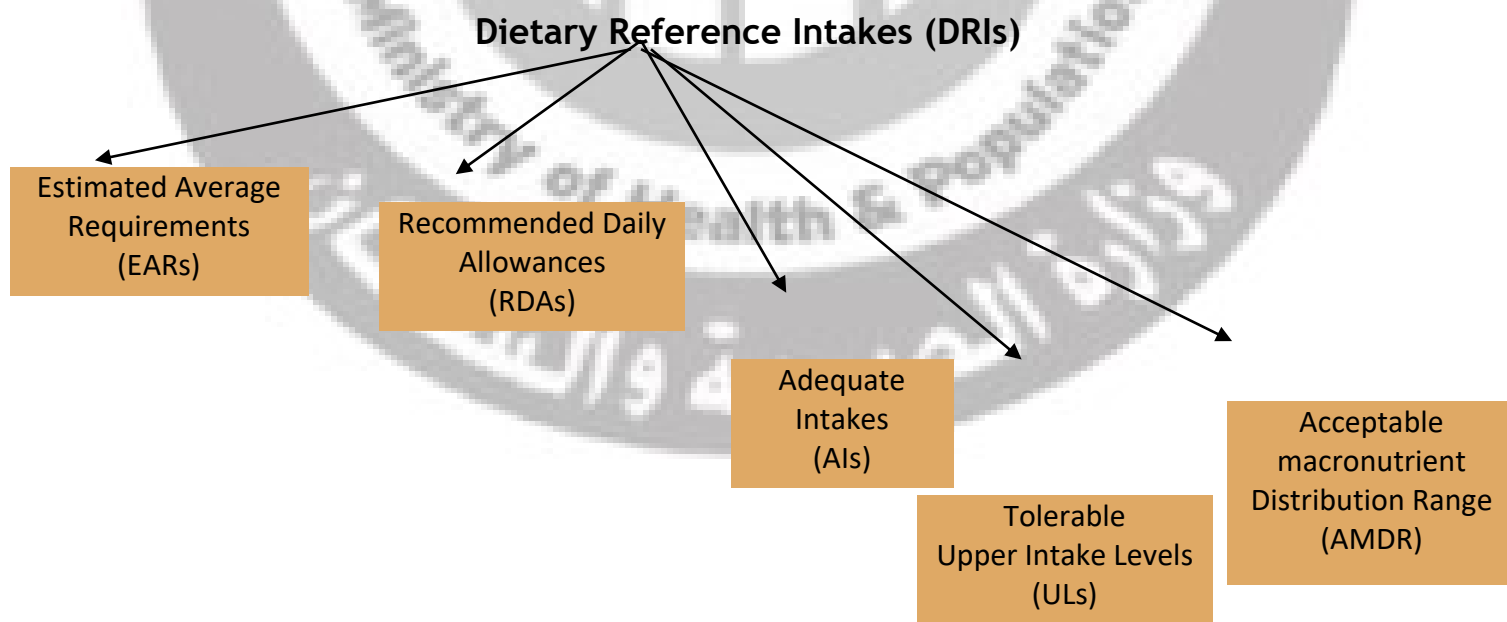
Dietary Reference Intakes (DRIs)

Those are reference values or standards for nutrients that establish adequate amounts and maximum safe nutrient intakes in the diet.

Dietary Reference Intakes (DRIs):

Dietary Reference Intakes is the general term for a set of reference values used to plan and assess nutrient intakes of healthy people. It focuses on:

- Maintaining good health
- Reducing the risk of developing chronic disease
- Avoiding unhealthy excess (toxic amounts of nutrients)



1. Estimated Average Requirements (EAR)

- Amount of a nutrient that meets the needs of 50% of healthy people by age and gender.
- EAR used to assess groups
- EAR is used to calculate RDAs

2. Recommended Dietary Allowance (RDA)

- The **daily amount** of a nutrient is considered adequate to meet the known nutrient needs of ~ 98% of all healthy people in a specific gender and age group.
- Allowances are set higher than the EARs (The RDA is set two standard deviations above the mean requirement: $RDA = EAR + 2SD$)
- **RDA** is a goal for an individual

3. Adequate Intakes (AI)

- Set when there is no enough scientific evidence to determine an RDA
- Estimate based on the judgment of the FNB members.

4. Tolerable Upper Intake Level (UL)

- Highest amount of a nutrient that is **unlikely to cause harm** if consumed daily
- Consumption above this level increases risk of toxicity
- maximum daily intake to avoid adverse effects

5. Acceptable Macronutrient Distribution Ranges (AMDR)

- A range of intakes for a **particular energy source** that is associated with reduced risk of chronic disease while providing adequate intake of essential nutrients. Expressed as a percentage of total energy intake.

Addresses the recommended balance of fuel nutrients to meet physiological needs

- | | |
|-----------------|----------------------|
| • Carbohydrates | 45-65% of daily kcal |
| • Fats | 20-35% of daily kcal |
| • Proteins | 10-35% of daily kcal |

Uses of DRIs

- To **plan** a quality diet and make healthy food choices; to meet the RDA or AI of all nutrients, not exceed the UL, consume the energy-yielding nutrients within the ranges of the AMDR
- **Evaluate** dietary practices
- **Develop** certain food products
- **Provide** standards for nutritional labeling purposes daily Values

Chapter 9

Nutrition Planning II

Objectives

- Define nutrient density, energy density, empty calories
- Describe the food guidance system, Mypyramid, MYplate, Healthy Eating plate
- Use the MyPyramid Plan to develop nutritionally adequate daily menus.

What is Nutrient Density, Nutrient Dense food?

- It is comparison of vitamin and mineral content of the food to the number of kcals.
- Measurement of the nutrients in a food compared to the kilocalorie content

Nutrient dense food is:

- High in nutrients and low in kilocalories
- Provides more nutrients per kilocalorie
- Low in fat and added sugar

What is Energy Density?

- It is comparison of the kcal content of the food with the weight (grams) of food.

Energy dense food:

- Food rich in calories but weighs little (high Fat food)
- Low-energy-density foods in a meal contributes to satiety (Foods with more water and dietary fiber)

What is Empty- calorie foods?

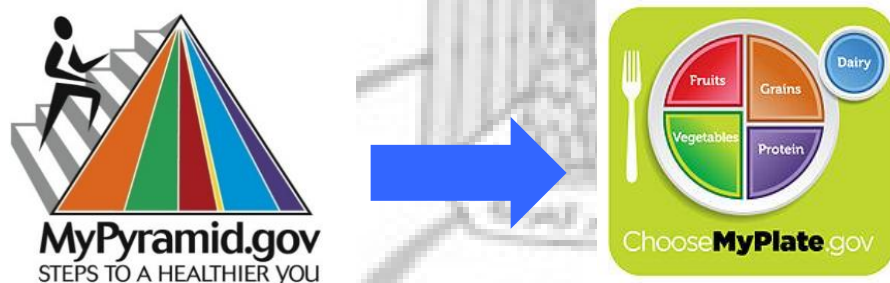
- Foods that is markedly low in nutrient density.
 - Calories provided from these foods are called “empty” because they give a lot of energy (from added sugars, solid fats or both) but no or little protein , vitamins and minerals
 - Provides kcal and few to none other nutrients

- Are excess calories
- Example: chocolate chips cookies, soft drinks, potato chips, candies

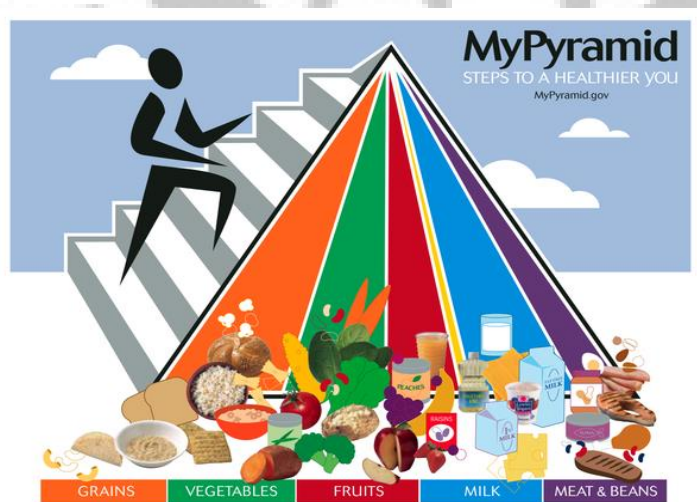
Food guidance system

- Food Guide Pyramid. Is a pyramid shaped guide for healthy foods divided into sections to show the recommended intake for each food group. It helps people to understand the elements of a healthy diet.
 -The USDA in 2005 put MyPyramid and in June 2010 put a simpler form MyPlate.

-Harvard School of Public Health created the first Healthy Eating Pyramid and recently the Healthy Eating Plate. Just as the Healthy Eating Pyramid corrects the mistakes of the USDA's Food Guide Pyramid, the Healthy Eating Pyramid and the Healthy Eating Plate complement each other.



Major new features in this pyramid that are improvements over the old one



Anatomy of MyPyramid

- **Activity**
 Activity is represented by the steps and the person climbing them, as a reminder of the importance of daily physical activity.

- **Moderation**

Moderation is represented by the narrowing of each food group from bottom to top. The wider base stands for foods with little or no solid fats or added sugars. These should be selected more often. The narrower top area stands for foods containing more added sugars and solid fats. The more active you are, the more of these foods can fit into your diet.

- **Personalization**

Personalization is shown by the person on the steps, the slogan, and the URL. Find the kinds of amounts of food to eat each day at MyPyramid.gov

- **Proportionality**

Proportionality is shown by the different widths of the food group bands. The widths suggest how much food a person should choose from each group. The widths are just a general guide, not exact proportions. Check the Web site for how much is right for you.

- **Variety**

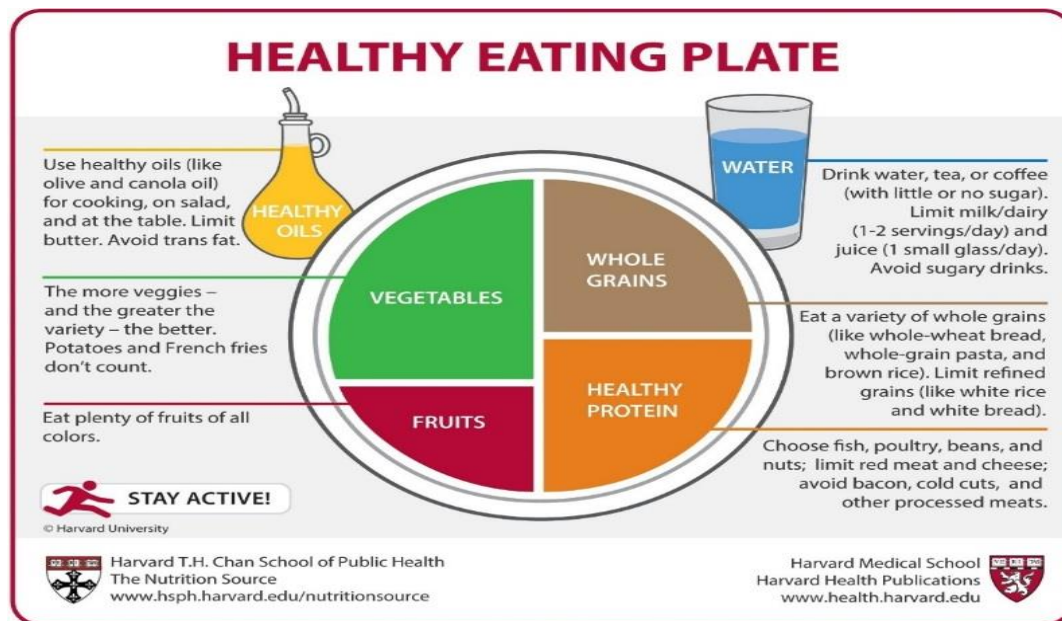
Variety is symbolized by the 6 color bands representing the 5 food groups of the Pyramid and oils. This illustrates that foods from all groups are needed each day for good health.

- **Gradual Improvement**

Gradual improvement is encouraged by the slogan. It suggests that individuals can benefit from taking small steps to improve their diet and lifestyle each day.

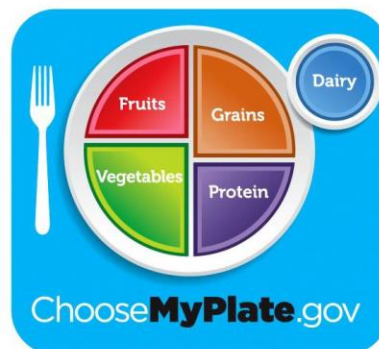
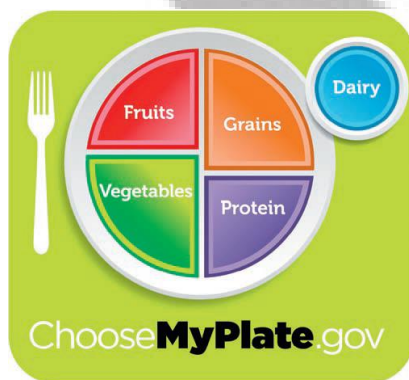
The Healthy Eating Plate

<http://www.hsph.harvard.edu/nutritionsource>¹



What is MyPlate?

- A graphic to summarize guidelines to healthy eating
- It illustrates the five major food groups using a familiar mealtime visual—a place setting as shown below.
- It was released June 2011
- Recommendations are for 2 years and over
- The familiar plate is a simple reminder to make better choices
- The easy-to-remember visual cue provides a way to control portion sizes



Balancing Calories

- Enjoy your food, but eat less.
- Avoid oversized portions.

Foods to Increase

- Make half your plate fruits and vegetables.
- Make at least half your grains whole grains.
- Switch to fat-free or low-fat (1%) milk.

Foods to Reduce

- Compare sodium in foods such as soup, breads, and frozen meals—and choose the foods with lower numbers.
- Drink water instead of sugary drinks.

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FOOD GROUP - MAJOR NUTRIENTS - SERVING EQUIVALENTS²

Food Group	Major Nutrient	Serving Equivalents
Fruits (color code red)	Vitamin C Folate Potassium Fiber	1 cup raw or cooked fruit or 1 cup 100% fruit juice or ½ cup dried fruit equals 1 cup from the fruit group
Vegetables (color code green)	Vitamin A Vitamin C Vitamin E Vitamin B6 Folate Potassium Fiber	1 cup raw or cooked vegetables or 1 cup vegetable juice or 2 cups raw leafy greens equal 1 cup from the vegetable group
Grains (color code deep orange) Enriched grains	Thiamin Riboflavin Niacin Folate Iron	1 slice of bread, 1oz ready-to-eat cereal (about 1 cup cereal flakes), ½ cup cooked rice, pasta, or cooked cereal, 1 tortilla (6-inch diameter) or 1 pancake (5-inch diameter) equals 1oz from the grains group
Whole grains	Zinc, magnesium, and fiber in addition to the nutrients in enriched grains	
Protein foods (color code purple)	Protein Thiamin Riboflavin Niacin Vitamin B6 Vitamin B12 Iron Zinc Vitamin E (nuts)	1 oz lean meat, poultry, or seafood, 1 egg, 1Tbsp peanut butter, ¼ cup cooked dry beans or peas, or ½ oz nuts or seeds equals 1 from the protein foods group
Dairy (color code blue)	Protein Vitamin A Riboflavin Vitamin B12 Calcium Phosphorus Magnesium	1 cup milk, 1 cup yogurt, 1 cup fortified soy or rice beverage, 1½ oz natural cheese (e.g.cheddar) or 2 oz processed cheese equals 1 cup from the dairy group
Other important food components Oils (Not a food group but oils supply essential nutrients)	Vitamin E Linoleic acid Alpha-linolenic acid	Includes vegetable, nut, and fish oils and soft vegetable oil table spreads that have no trans fats (Equivalents differ according to source)

²Source: William's Essentials of Nutrition and Diet Therapy, 11th Edition 2014, Chapter 1 Nutrition and Health page 16-17

Adapted from: Data from Dietary Guidelines Advisory Committee, 2005: Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans 2005, Beltsville, Md., 2004, U.S. Department of Agriculture, Agricultural Research Service, and U.S. Department of Agriculture and U.S. Department of Health and Human Services: Dietary Guidelines for Americans, 2010 (Policy Document), ed 7, Washington, D.C.,2010, U.S. Government Printing Office.

Chapter 10

Exchange list

Objectives

- Exchange List I:
- Calculating total caloric intake (AMDR)
 - Calculating total caloric intake for healthy and obese patients
 - Determination of the percentage of the individual macronutrients according to the Acceptable Macronutrient Distribution Ranges (AMDR)
 - Tailoring an individual meal plan according to the predetermined calories and number of servings

Applying Exchange List System as an excellent tool for:

- 1- Meal planning
- 2- Calorie Control
- 3- Meeting AMDRs and DRIs

Basic Steps to Formulate a Dietary Meal Plan

After performing a careful Nutritional Assessment, the following steps should be applied:

- Estimate individual total caloric intake
- Calculating the Acceptable Macronutrient Distribution Ranges (AMDR)
- Determine total calories and grams for each macronutrient
- Estimate servings number
- Designing a Meal plan using Exchange List

Estimate Total Caloric Intake

Harris Benedict using Age, weight and gender

We use the modification:

BMR X Activity Factor

BMR = Females = $\text{Kg} \times 0.9 \times 24 \text{ hrs}$

Males = $\text{Kg} \times 1 \times 24 \text{ hrs}$

Activity	Factor
No or Little	1.2
Light 1-3 days	1.3
Moderate 3-5 days	1.5
Heavy 6-7 days	1.7
Vigorous twice/day	1.9

Estimate Total Caloric Intake

TABLE 1.9. Energy Requirements Based on Kilocalories per Kilogram of Body Weight

Condition	Energy Requirement (kcal/kg)
Normal	25–30
Obese, critically ill (BMI >30)	11–14 (actual body weight) or 22–25 (ideal body weight)
Stress	
Mild	30–35
Moderate to severe	35–45

Data from (i) Escott-Stump S. *Nutrition and Diagnosis-Related Care*. 8th ed. Philadelphia, PA: Wolters Kluwer; 2015, and (ii) McClave SA, Martindale RG, Vanek VW, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.). *JPEN J Parenter Enteral Nutr* 2009;33:277–316.

Calculating Acceptable Macronutrient Distribution Ranges (AMDR)

- Distribute the calculated daily caloric needs to the different macronutrients
- 15-25 % Protein : 1.2gm/ kg ensuring that no less than 0.8 gm/kg is given (RDA).
- 45-65% CHO: Carbohydrate (CHO) content : 45-65 % ensuring that the ratio of Complex CHO (Starch and legumes together) to Simple CHO (Milk ,Fruits and added sugars) is approximately 70% : 30% respectively.
- 25-35% Fat: Fat distribution should follow this criteria
 - Saturated Fatty acids (SFA): Less than 10% of total Kcal
 - Polyunsaturated Fatty acids (PUFA) : 10% of total Kcal
 - Monounsaturated Fatty acids (MUFA) : More than 12- 20% of total Kcal
 - Trans Fats : Less than 1%
- Determine Total Calories and Grams for Each Macronutrient

Protein calculated in grams, to convert it to calories multiply the number of grams by 4.

 - Estimate the amount of Grams in each macronutrient by dividing the calories by 4 in CHO, and by 9 in fat.
 - 1 gm of CHO gives around 4 Kcal
 - 1gm of Protein gives around 4 Kcal
 - 1 gm of Fat gives around 9 Kcal
 - For example: A 70 kg person will need ($70 \times 1.2 = 84$ gm) equals ($84 \times 4 = 336$ Kcal).
 - 800 Kcal would be produced from 200 gm of CHO ($800/4$).
 - 360 Kcal of fat would be produced from 40 gm of Fat ($360/9$).

Estimate Servings Number

After estimating the required grams of the different macronutrients, fill in the following table where you estimate the serving numbers of the different food groups in each macronutrient.

- Use Exchange List: 1 serving =
 - 15 gm CHO
 - 7 gm Protein
 - 5 gm Fat

Macronutrient	CHO	Protein	Fat
Grams			

- Use food exchange List to distribute food servings correctly for each food group.
 - N.B: Estimate the Protein content of CHO food components. Some common examples are: Starch 3 gm/serving, Legumes 7 gm /serving, milk 8gm/serving).

Macronutrient	Food component	Number of servings	CHO content / servings (gm)	Protein content /servings (gm)	Fat content /servings (gm)
CHO	Starches				
	Fruits				
	Milk				
	Nonstarchy Vegetables				
	Added sugars				
Protein	Meat and meat substitutes				
Fat	SFA , PUFA and MUFA				
Total gm of each macronutrient					

The following table could be used as a reference or guide for servings estimation. Serving numbers are further remodified according to the Patient's needs of required grams from each food group.

Calories per day*					
	1200	1600	1800	2000	2200
Carbohydrates					
Starches	5	7	8	9	10
Fruits	3	3	3	4	4
Milk	2	3	3	3	3
Sweets, Desserts, & Other Carbohydrates †					
Nonstarchy Vegetables	3	4	5	6	6
Meat & Meat Substitutes	4 oz	6 oz	6 oz	7 oz	8 oz
Fats	3	5	6	6	7

Design a Suitable Meal Plan

- After figuring out the exact number of servings, and ensuring the total grams of each macronutrient are suitable to the recommendations, formulate the meal plan.
- Using the exchange list to distribute servings to the different eating times of the day including snacks in a balanced manner.

Meals (Food Items)	Starches	Fruits	Milk	Vegetables	Meat & meat substitutes	Fat
Breakfast						
Snack						
Lunch						
Snack						
Dinner						
Total servings						

*** Example of a Meal Plan using Exchange list**

Item	Bread	Vegetable	Fruit	Milk	Meat oz.	Fat ¹ grams	Calories ¹
BREAKFAST							
Grapefruit juice, 3/4 cup			1			trace	70
* Breakfast pita, 1 serving 4-inch whole-wheat pita vegetables egg	1	1/4			1/2	6	171
Skim milk, 1 cup				1		trace	86
LUNCH							
* Turkey pasta salad, 1 serving macaroni red grapes turkey	1		1/2		2	6	264
Tomato wedges, lettuce leaf		1				trace	27
Small hard roll	1					1	78
Soft margarine, 1 teaspoon						4	34
Skim milk, 1 cup				1		trace	86
DINNER							
* Creole fish fillets, 1 serving cod vegetables		1			3	1	131
Small new potatoes with skin, 2		1				trace	68
Cooked green peas, 1/2 cup with soft margarine, 1 teaspoon		1				trace 4	67 34
* Whole-wheat cornmeal muffin	2					4	129
Soft margarine, 1 teaspoon						4	34
* Peach crisp, 1/2 cup rolled oats and flour frozen peaches	1/2		3/4			4	153
SNACKS							
Medium bagel	2					1	153
Soft margarine, 1 teaspoon						4	34
Jelly, 1 teaspoon						trace	16
Total	7-1/2	4-1/4	2-1/4	2	5-1/2	39	1,635

Chapter 11

Exchange list II

Objectives

- Exchange List II:
 - Meal Planning using exchange list

Planning for A Healthy Diet Applied Approach

Exchange list

- Originally developed for diabetes
- Can aid in controlling caloric intake
- Separates foods based on their content of the energy yielding nutrients,
 - Carbohydrate, protein, fat
- Aids in controlling blood glucose concentration

How Does the Food Exchange System Work?

- A food exchange list is a system of determining a daily food plan based on units, or exchanges of various food types. . It simplifies teaching of carbohydrate-control concept.
- The nutrient content of each item on the list is calculated according to its [serving size](#), so that items in the same category have approximately the same nutritional value
- One serving size of a food in a category can be exchanged for one serving size of any other food in the same category, which is why a serving is called an exchange.



This is what
one serve
of different
vegetables looks
like



Do you eat
5
handfuls
every day



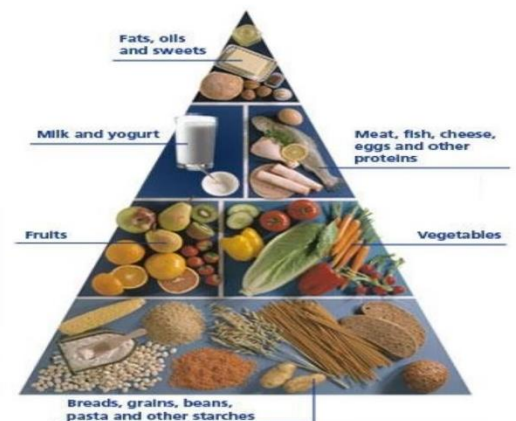
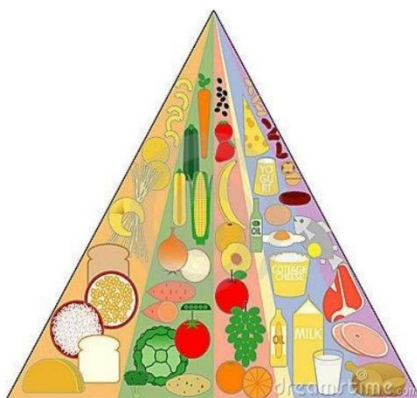
An Easy Way To Plan Meals & Track What You Eat

The objective of using diabetic exchange lists is to maintain the proper balance of carbohydrates, proteins, and fats throughout the day.

Foods Split into 6 Groups Each group contains foods with similar nutrients and calories

Food Pyramid VS Exchange List

Dietitians should note that the Food Guide Pyramid groups do not match those of the exchange list for diabetics.



For example, starchy vegetables such as potatoes, corn, and green peas are grouped with breads, cereals, and other grain products.

Carbohydrates (45-65%)*

Carbohydrate group contains the starch, fruit, milk and vegetable

15 grams of Carbohydrates for all choices STARCH

Starch exchanges include breads, cereals, starchy vegetables, crackers and snacks, and beans, peas, and lentils.

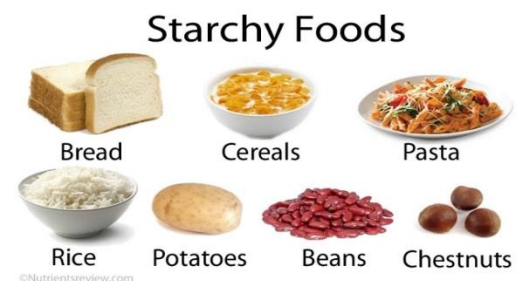
1 exchange provides:

- 15 grams carbohydrate
- 0-3 grams protein
- 0-1 gram fat N.B Some starchy foods are prepared with fat so they count as 1 starch and 1 fat exchange 80 calories



A few examples of one starch exchange are:

Bread	1 slice (1 oz)
Pasta	1/3 cup, cooked
Rice	1/3 cup, cooked
Beans, Peas & Lentils	1/3 cup



Because these legumes have such a high protein content, we also count them as a choice from the Meat group as well

FRUITS

1 exchange provides:

15 grams carbohydrate
0 grams fat and protein
60 calories

One fruit exchange is:

1 small fresh fruit (4 oz)
3/4 to 1 1/4 cup of freshfruit
1/2 cup of canned fruit



Non Starchy Vegetables

1 exchange provides:	One non starchy vegetable exchange is:
5 grams carbohydrate	• 1/2 cup of cooked vegetables
One non starchy vegetable exchange is:	
2 grams protein	• 1/2 cup of vegetable juice
0 grams fat	• Non starchy vegetables include fresh, frozen, or canned vegetables.
25 calories	N.B: 1 cup of raw vegetables (Raw salad greens are “Free Foods”)

Milk

1 exchange provides:

12 grams carbohydrate
8 grams protein
0-8 grams fat
100-160 calories

One milk exchange is:

1 cup of fat-free or 1% milk (see chart)
2/3 cup of plain fat-free or low-fat yogurt

Whole milk or yogurt counts as a milk exchange and 1 ½ fat exchange

While it's true that cheese is a dairy product, we do not include it into this group due to its high fat content

Type of milk or yogurt	Fat (grams)	Calories
Fat-Free or Low-Fat (1%)	0-3	100
Reduced-Fat (2%)	5	120
Whole	8	160



Sweets, Desserts and Other Carbohydrates

Foods on this list include foods that contain added fat and/ or sugar.

1 exchange provides:

15 grams carbohydrate

Protein, fat, and calorie content **varies**

Count as 1 carbohydrate (either a Starch, Fruit, or Milk on your meal plan)

Cookie with crème filling	2 small
Ice cream, light	1/2 cup



Meat, Cheese and Meat Substitutes (10-35%)*

Group contains very lean, lean, medium-fat, and high-fat meat and substitute lists.

1 exchange provides:

7 grams protein

0-8 or more grams fat

0 grams carbohydrate

45-100 calories

One meat exchange is:

1 ounce cooked meat, fish, poultry

1 ounce cheese

1/2 cup cooked beans, peas, or lentils (1 Meat + 1 Starch)

1 egg

1 Tbsp peanut butter/nut spreads



FATS (20-35%)*

group contains monounsaturated, polyunsaturated and saturated fat lists.

1 exchange provides:

5 grams fat

0 grams carbohydrate

0 grams protein

45 calories

One fat exchange is:

1 teaspoon of margarine, butter, oil, or regular mayonnaise

1 tablespoon of regular salad dressing



Almonds or cashews	6 nuts
(black) olives	8 large
Cream cheese, reduced-fat 1 1/2 Tbsp fat*	1/2 Tbsp

The Dietary Guidelines recommend that 20%- 35% of our calories come from fat.

Free Foods

Foods on this list contain less than 20 calories and 5 grams or less of carbohydrate per serving. When no serving size is given, you can eat the food as often as you desire.



Drinks / Mixes	Seasonings *	Condiments
Bouillon Club soda Coffee Diet soft drinks Unsweetened tea Water	Herbs Spices Wine, used in Cooking Worcestershire sauce * Limit seasonings	Catsup (1 Tbsp) Lemon or lime juice Mustard Salsa (1/4 cup) Vinegar

Exchange List (Summary)

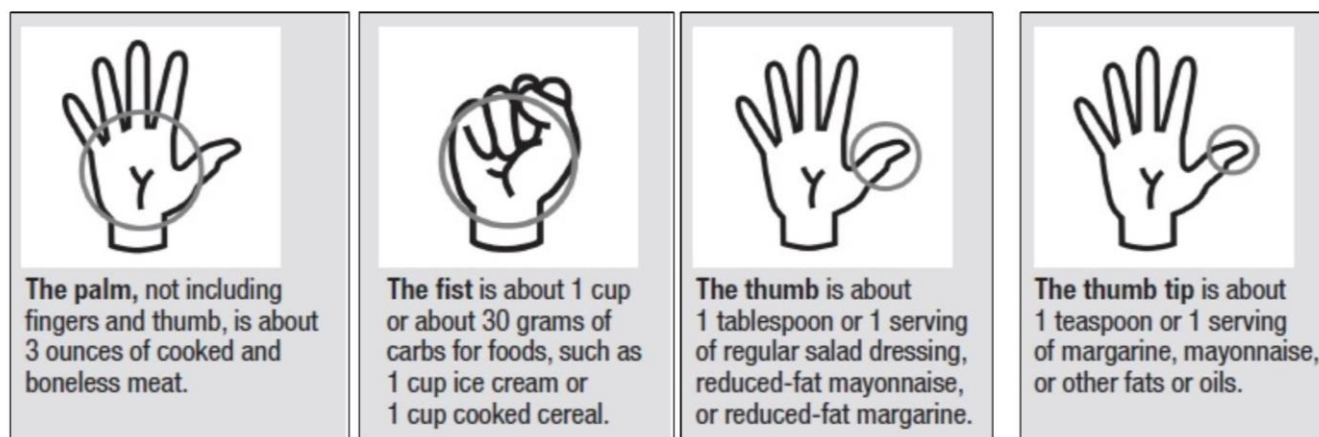
Groups/Lists	Example	Carbs (gm)	Protein (gm)	Fat (gm)	Calories
Carbohydrate Group					
Starch	1 toast or 1/4 bread or 3 Tbs rice or 4 Tbs macaroni or 100gm potato or 1/2 cup cereal or 1/3 cup beans	15	3	0-1	80
Fruit	3 dates or 1 apple or 1/2 cup juice	15	—	—	60
Vegetables	1 cup raw or 1/2 cup cooked or 1/2 cup juice	5	2	—	25
Milk					
Fat-Free	1 cup of fat-free or 1% milk	12	8	0-3	90
Reduced-Fat	2/3 cup of low-fat yogurt	12	8	5	129
Whole	1 milk exchange & 1/2 fat exchange	12	8	8	150
Sweets and Other Carbs		15	varies	varies	varies
Meat and Meat Substitute Group					
	1 egg, 1 ounce cooked meat, fish, poultry, 1 ounce cheese 1/3 cup Plant-based proteins cooked beans, peas, or lentils or hummus (1 Meat + 1 Starch) 1 Tsp peanut and nut butters. (1 meat + 1 fat) (N.B.: 1 oz = 30 gm)				
Very Lean	1 egg whites or chicken breast	—	7	0-1	35
Lean	Chicken or turkey (no skin) or fish fresh or canned salmon or tuna	—	7	3	55
Medium-Fat	ground beef, meat loaf or fried chicken or fish	—	7	5	75
High-Fat	Cheese (cheddar, Swiss) or hot dogs and sausage.	—	7	8	100
Fat Group	1 Tea sp oil 6 Almonds or cashews	—	—	5	45

In developing a menu, we must first establish the client's **individual dietary requirements**, particularly the optimal number of **daily calories** and the **proportion** of carbohydrates, fats, and protein.

The exchange lists should then be used to set up menus for each day that fulfill these requirements

Another way to estimate portions when you can't weigh them

A Handy Guide to Protein Sizes



Hand sizes vary. These portion estimates are based on a woman's hand size.
Measuring or weighing foods is the most accurate way to figure out portion size.

Resources

American Association of Diabetes Educators
www.diabeteseducator.org
American Diabetes Association
www.diabetes.org
Academy of Nutrition and Dietetics
www.eatright.org
The Official Pocket Guide to Diabetic Exchanges
American Diabetes Association, 2011.

Chapter 12

Basics in Food Safety

Objectives

- Define food safety
- Describe the conditions that favors the growth of microorganisms in food
- Identify actions that contaminate food
- List the guidelines and standards for safer food and the hygienic practices for food handlers

Definition

What is Food safety?

It refers to the conditions and practices that preserve the quality of food to prevent contamination and food borne illnesses.

Food Safety is a general term refers to reduce the risk of individuals becoming sick from food borne through managed handling, preparation and storage of foods.

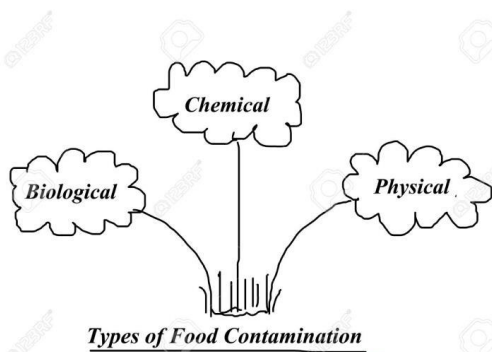
The main aim of food safety is to prevent the food from contamination. Regardless of why you are handling the food it is essential that always apply the proper food safety principles.

What is HACCP?

Hazard Analysis and Critical Control Point: A system which identifies, evaluates and controls hazards which are significant to food safety. *(This system will be studied in details in another course).*

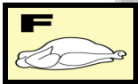
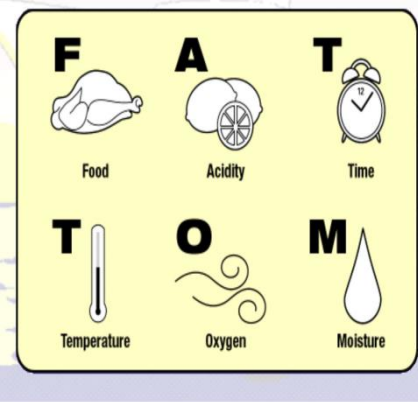
What contaminates food (Hazards found in food)?

1. Biological: Viruses, Bacteria, Parasites and Fungi
2. Chemical: Cleaners, Sanitizers, Polishes, Machine lubricants. Toxic metals
3. Physical: Hair, Dirt, Bandages, Metal staples, Broken glass, Natural objects (e.g., fish bones in a fillet)



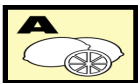
What are the conditions that favour the growth of food borne organisms?

The conditions that favor the growth of most foodborne microorganisms (except viruses) can be remembered by the **acronym FAT-TOM**.



Food

- o To grow, microorganisms need nutrients, specifically proteins and carbohydrates. These proteins are commonly found in foods such as meat, poultry, dairy products, and eggs.



Acidity

- o Microorganisms typically do not grow in foods that are highly acidic or highly alkaline.
- o Pathogenic bacteria grow well in foods with a pH between 4.6 and 7.5. Foods with a pH higher than 7.0 do not typically support the growth of foodborne microorganisms.



Temperature

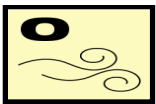
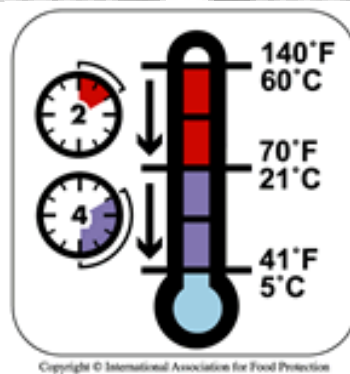
- o Most foodborne microorganisms grow well between the temperatures of (5°C to 60°C). This range is known as the temperature danger zone.
- o Exposing microorganisms to temperatures outside the danger zone does not necessarily kill them. Refrigeration temperatures, for example, may only slow their growth. Bacterial spores

can often survive extreme heat and cold.



Time

- o Microorganisms need sufficient time to grow. Bacteria can multiply rapidly if left at room temperature or in the **“Danger Zone” between 40°F and 140°F (5°C to 60°C).** Never leave perishable food out for more than 2 hours.
- o If contaminated food remains in the temperature danger zone for four hours or more, pathogenic microorganisms can grow to levels high enough to make someone ill.
- o Prepare food as close to serving as possible.



Oxygen

- o Most microorganisms that cause foodborne illness can grow with (aerobic) or without (anaerobic) the presence of oxygen.



Moisture

- o Most foodborne microorganisms grow well in moist foods.
- o The amount of moisture in a food is called its water activity (a_w). Water activity is measured on a scale from 0 through 1.0, with distilled water having a water activity of 1.0.
- o Potentially hazardous foods typically have a water activity of 0.85 or above

The WHO Five Keys to Safer Food¹

(1) Keep clean

- ✓ Wash your hands
- ✓ Wash and sanitize all surfaces and equipment used for food preparation
- ✓ Protect kitchen areas and food from insects, pests and other animals

(2) Separate raw and cooked

- ✓ To avoid cross contamination, keep raw and cooked foods separate when shopping, storing and preparing.
- ✓ Food should be stored in covered containers in the fridge and put raw meats and poultry in the bottom of the fridge so the juices don't contaminate food on lower shelves.

(3) Cook thoroughly;

- ✓ Cook chicken, meats, eggs and seafood until they reach 70°C (until juices of meat and poultry are clear or maintain boiling of soups for at least 1 min). ideally a thermometer can be used.
- ✓ Defrost frozen poultry meats thoroughly before cooking.

(4) Keep food at safe temperatures

- ✓ Do not keep cooked food at room temperature more than 2 hours
- ✓ Refrigerate food to less than 5°C promptly
- ✓ Leftovers should not be kept in the refrigerator for more than 3 days and not heated more than once
- ✓ Never thaw food at room temperature. Thaw food at the refrigerator

(5) Use safe water and raw materials

What are the food safety practices at home? ^{2,3}

There are four basic steps to food safety at home:

1. Clean - always wash your fruits and vegetables, hands, counters, and cooking utensils.
2. Separate - keep raw foods to themselves. Germs can spread from one food to another.
3. Cook - foods need to get hot and stay hot. Heat kills germs.
4. Chill - put fresh food in the refrigerator right away.



CLEAN

CLEAN: *Wash your hands and surfaces often.*

- Germs that cause food poisoning can survive in many places and spread around your kitchen
- Wash hands for 20 seconds with soap and water before, during, and after preparing food and before eating.
- Wash your utensils, cutting boards, and counter tops with hot, soapy water. Do this after working with each food item.
- Rinse fresh fruits and vegetables under running water.
- Clean the lids on canned goods before opening.



SEPARATE

SEPARATE: *Don't cross-contaminate. Keep apart*

- Raw meat, poultry, seafood and eggs can spread germs to ready-to-eat foods—unless you keep them separate.
 - Use separate cutting boards and plates for raw meat, poultry, and seafood.
 - When grocery shopping, keep raw meat, poultry, seafood, and their juices away from other foods.
 - Keep raw meat, poultry, seafood, and eggs separate from all other foods in the fridge.



COOK

COOK: *To the right temperature.*

- Food is safely cooked when the internal temperature gets high enough to kill germs that can make you sick. The only way to tell if food is safely cooked is to use a food thermometer. You can't tell if food is safely cooked by checking its color and texture.
 - Use a food thermometer to ensure foods are cooked to a safe internal temperature.
 - You can't always tell by looking



CHILL

CHILL: Refrigerate promptly.

- Keep your refrigerator below 40°F
- 2-Hour Rule: Refrigerate perishable food within 2 hours. (If outdoor temperature is above 90°F, refrigerate within 1 hour.)
- Thaw frozen food safely in the refrigerator, in cold water, or in the microwave. Never thaw foods by leaving it on the counter, because bacteria multiply quickly in the parts of the food that reach room temperature.

General advices and guidelines in food safety practices

What are the actions that contaminate food?

- o Running fingers through hair
- o Scratching scalp
- o Wiping/touching nose
- o Rubbing ear
- o Touching pimple/infected wound
- o Wearing dirty uniform
- o Coughing/sneezing into the hand
- o Spitting in food

What are the situations that contaminate food?

- o Having Foodborne illness
- o Wounds that contain a pathogen
- o Sneezing/coughing
- o Contact with a person that is ill

When to wash Hands?

- o Using the restroom
- o Handling raw meat, poultry, seafood
- o Touching hair, face, or body
- o Sneezing, coughing, or using tissue
- o Eating, drinking, smoking, chewing gum/tobacco

- o Handling chemicals that might affect food safety
- o Taking out garbage
- o Clearing tables or dirty dishes
- o Touching clothes/aprons
- o Handling money
- o Leaving/returning to the kitchen/prep area
- o Handling aquatic animals
- o Dirty dishes

How to wash your hands

1. Wet your hands and arms. Use running water
2. Apply enough soap to build a good lather
3. Lather and scrub hands and arms vigorously for 20 seconds. Clean under finger nails and between fingers
4. Rinse for 10 seconds
5. Turn off the tap using a paper towel
6. Dry your hands. Use a single-use paper towel or hand dryer



Food handlers - fitness to work

Checklist for Good Hygiene Practice:

- 1) Wash and dry hands thoroughly after going to the toilet and before handling food.
- 2) Do not handle food if suffering from diarrhoea and/or vomiting.

- 3) Tell the Line Manager if anyone in the household is ill.
- 4) Tell the Line Manager about any infected cuts and sores.
- 5) Tell the Line Manager about any illness while on holiday.
- 6) Do not spit, smoke, eat or chew gum when handling food.
- 7) Make sure work clothes are clean.
- 8) Keep the workplace, especially surfaces and utensils, clean.
- 9) Use blue coloured waterproof plasters to cover cuts and grazes.
- 10) When visiting the Doctor with an illness which might be transmitted through food, tell the Doctor about being a food handler.

References used

¹<http://www.who.int/mediacentre/factsheets/fs399/en/>

²<https://www.cdc.gov/foodsafety/keep-food-safe.html>

³https://www.fda.gov/ForConsumers/ByAudience/ForWomen/ucm118524.htm?gclid=Cj0KCQjwzK_bBRDDARIsAFQF7zO3wonLgE9mU8PvKiW1RRYgyjvSAfBGITTa7qpBonnE-Pw0oylZo1EaAgoCEALw_wcB

General guidelines for prevention of foodborne infections

Prevention of foodborne infections is based on access to safe water and proper sanitation as well as adhesion to safe food handling practices.

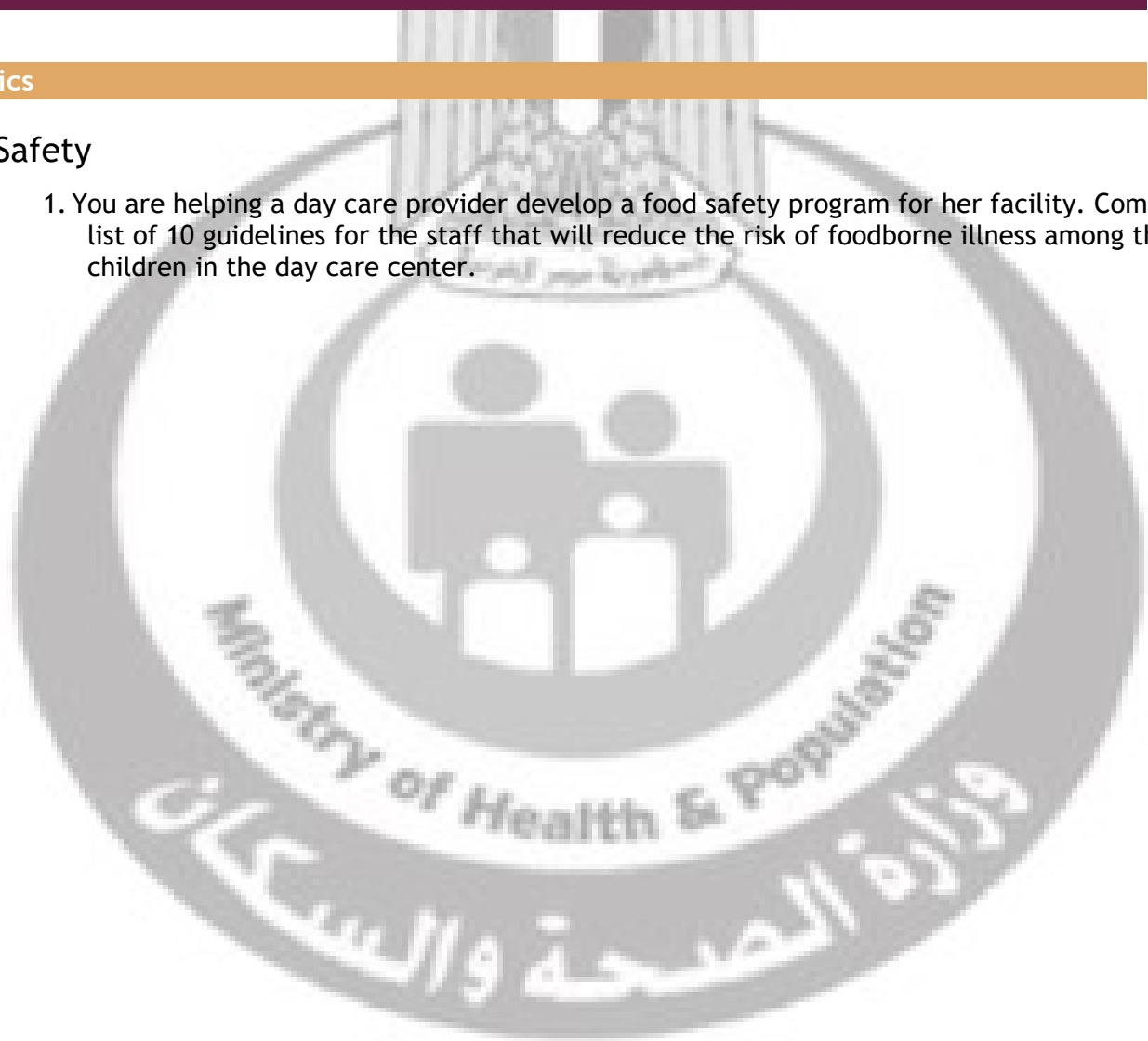
- 1) Educate the public to the importance of hand washing and provide suitable handwashing facilities, particularly for food handlers and attendants involved in the care of patients.
- 2) Dispose of human feces safely and away from sources of drinking water. Maintain fly-proof latrines.
- 3) Protect, purify and chlorinate public water supplies, provide safe private supplies, and avoid possible backflow connections between water and sewer systems.
- 4) Control flies and fly-breeding places through frequent garbage collection and disposal and through fly control measures.
- 5) Strict cleanliness in food preparation, handling, storage; refrigerate as appropriate
- 6) If uncertain about sanitary practices, select foods that are cooked and served hot, and fruit peeled by the consumer.
- 7) Pasteurize or boil all milk and dairy products.
- 8) Enforce suitable quality-control procedures in industries that prepare food and drink for human consumption. Use chlorinated water for cooling during canned food processing.
- 9) Encourage exclusive breastfeeding for the first 6 months and safe weaning practices throughout infancy and childhood.

Practical exercises and questions

Topics

Food Safety

1. You are helping a day care provider develop a food safety program for her facility. Compile a list of 10 guidelines for the staff that will reduce the risk of foodborne illness among their children in the day care center.



2. Use this survey questionnaire to assess food safety practices at home

Questionnaire to measure safe food preparation practice Basics in Clinical nutrition course 2018

Question Item	Response		
Key 1 Keep Clean - Do you wash your hands before handling food and often during food preparation? - Do you wash and clean all surfaces and equipment used for food preparation? - Do you protect your kitchen area and food from insects, pests and other animals?	Always ☐	Sometimes ☐	Rarely ☐
Key 2 Separate raw and cooked - During handling food do you separate raw meat, poultry and seafood from other food? - Do you use separate equipments and utensils as knives and cutting boards for handling raw food? - Do you store food in containers to avoid contact between raw and prepared food?	Always ☐	Sometimes ☐	Rarely ☐
Key 3 Cook thoroughly - In particular, Are meat, poultry, eggs and seafood cooked thoroughly? - When cooking soups and stews do you bring them to boiling? - When cooking meat and poultry do you make sure that their juices are not pink but are clear? - When reheating cooked food do you reheat it thoroughly?	Always ☐	Sometimes ☐	Rarely ☐
Key 4 Keep food at safe temperature - Do you know what the danger zone temperature for food is? If yes Write it: - Do you ever leave cooked food at room temperature for > than 2hrs? - Are you keen to refrigerate all cooked & perishable food below 5°C - Do you keep cooked food piping hot prior to serving? - Do you store food too long even in the refrigerator? - Do you thaw frozen food at room temperature?	Always ☐	Sometimes ☐	Rarely ☐
Key 5 Use safe water and raw materials - Do you wash fruits and vegetables especially if eaten raw? - Do you peel vegetables when eaten raw? - Do you choose pasteurized milk over raw seller milk? - Do you check the expiry date of food before buying it? - When buying food do you select fresh and wholesome foods?	Always ☐	Sometimes ☐	Rarely ☐

Dr Sahar Sabbour

Adapted from WHO, 2012, Promoting a healthy diet for the WHO Eastern Mediterranean Region: user-friendly guide

3. Download the food safety checklist in the following link

<https://healthymeals.fns.usda.gov/hsmrs/Georgia/foodsafetychecklist.pdf>

Complete it to monitor food safety and sanitation practices. Visit a food serving facility; restaurant, cafeteria, hospital kitchen. Observe and comment

